Gas Journal, September 29, 1920.

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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLI. No. 2994.] LONDON, SEPTEMBER 29, 1920. [72nd Year. Price 8d.

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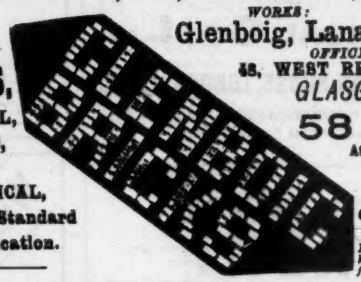

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EDITORIAL NOTES.

Instructions under the Gas Regulation Act.

JUST before going to press with this issue, the Board of Trade instructions relating to applications for Orders under the Gas Regulation Act were received; and they are printed in later columns. Comment will have to be deferred until next week, by which time we hope to have from the National Gas Council, for publication, advisory notes regarding the instructions and the lines of procedure.

The Advent of Therm Practice.

THE advent of the therm system of charging for gas has been made in South London. The South Metropolitan Gas Company were the first to secure, through their Special Act, the statutory right to put the new system into operation; and they have not lost any time in doing so. Monday last will be an historic date for the Company, and for the matter of that for the whole industry. The opportunity of the Company for taking the lead is, of course, only an accidental one, caused by the delay (which has been unavoidable) in getting the machinery into operation for conferring upon other gas undertakings similar powers by Order under the Gas Regulation Act. However, this is the beginning of the new order of things; and several other undertakings will, we anticipate, follow on next January, or from the taking of the meters in December. The South Metropolitan Company must have been early this quarter in getting through with their meter reading. The price per therm with which they start is 10½d.; and the declared calorific power 550 B.Th.U. Thus 1000 c.ft. represents 5½ therms; and so the 10½d. is equivalent to 4s. 9¾d. per 1000 c.ft.—an increase of only 1¾d. on the present price. The increase to prepayment meter consumers will be ½d. The 10½d. is ½d. below the standard of 11d. per therm specified in the Company's Act; so that, if any profit remains after paying interest on the loan capital, the preference dividend, and the 5 p.ct. minimum on the existing ordinary capital, there will be a sum equal to one-third part of the amount that the ½d. per therm on the total consumption represents for division between the proprietors and the gas-workers. We repeat "if any profit remains." At the moment, the Company are estimating and experimenting, because the experience only refers to the current quarter, and the consumption is, of course, an unknown quantity. We hope when the Directors' report and the statement of accounts for the year are published, separate information will be given as to the experience of the current quarter under the rule of the therm.

Price and Dividend Movements on the Therm Basis.

WE are afraid that the gas industry has somewhat lightheartedly gone-in for, and accepted, the change from the cubic foot to the therm unit basis of trading without considering all that it means from the accountancy point of view. This fear is engendered by an article which Mr. Herbert E. Ibbs, the Accountant of the Gas Light and Coke Company, and the compiler of the valuable work so long known as "Field's Analysis," has been induced to contribute to our columns, and which article gives some of the results of his first studies of the accountancy problems involved by the passing from the old to the new basis of trading. The business and practice of the gas industry has been built up on the cubic foot basis; and the change that is being made it must have been anticipated would produce difficulties, though their measure was perhaps insufficiently appreciated. But all the deeply thinking men of the industry are fully persuaded of this, that the therm basis has valuable inherent advantages—both technical and commercial—which the cubic foot basis did not possess; and therefore whatever difficulties are encountered must be overcome to bring the superior advantages to the assistance and credit of the gas industry. The conditions of the new basis confers on the industry greater economic freedom; and there is in it an inducement to larger patronage for all heating purposes. We need not to-day labour these points; it is for our accountants now to show us how best to adjust their part of the business to the new circumstances.

The difficulties are not insuperable; they can be overcome. But it is preferable they should be brought before us at once, and that a start should be made on lines that will very largely obviate them, and lines that will be the simplest that can be devised. In his article, Mr. Ibbs brings before us three or four main points over which difficulty may arise unless pre-arrangement places them upon a manageable basis. One is as to whether use will be made of one, or two, or even more places of decimals in stating prices per therm; and in this connection he hopes that a limit will be placed upon fractions of a penny being used in all cases. That is a hope to which most of us—we trust all—will devoutly subscribe. Farthing movements of price have been mentioned; but Mr. Ibbs prefers one-fifth of a penny, which can be expressed as 0·2d. This, in his opinion, is more desirable, as it involves only one decimal point. He gives reasons and examples for his choice. There will also be many cases where adjustments will have to be made in connection with prepayment meters; and again our contributor sets doubts and fears at rest by showing how it can be done. A matter over which great care will have to be exercised, when a change is made from one calorific value to a lower one, is in regard to the present excess charge per 1000 c.ft. for prepayment meters and fittings, &c., or else it may be found that the excess per therm upon the lower calorific value per cubic foot may produce a less sum than should be received; and in these days of high prices for new meters, fittings, and appliances, and maintenance and renewals, it will not do for this to happen. The argument for easily handled fractions of a penny for movements in the therm prices is carried on to the operation of the sliding-scale, as, in the event of the suggestion put forward by Mr. Ibbs being adopted, the only adjustment required would be in the slide dividend. The point is illustrated not only by argument but by a table. A question which arises here is whether it would not be better to drop the sliding-scale, and adopt the South Metropolitan Company's plan of a minimum dividend and a specified division of profits as between consumers, proprietors, and employees. There is, however, a doubt as to whether the Gas Regulation Act gives the Board of Trade power to make such a departure. In other words, it seems that the Board are limited in this particular matter, first, to the adjustment of existing terms to the therm basis, and, secondly, to the supplementing of these terms to cover the changes in economic circumstances.

The argument and suggestions contained in Mr. Ibbs's article require very careful study before indulging in criticism or pronouncing an unqualified acceptance. But those (if there are any) who seek to criticize had better make dead-sure of their ground, as the matters dealt with are ones in which we venture to say Mr. Ibbs has been living somewhat deeply lately, and with good cause, seeing that the figures of the Gas Light and Coke Company are the ones for which he is responsible. We are pleased to read

the final paragraph of the article: "As soon as the Board of "Trade make a move in the direction of granting Orders "under the new Act, it will be possible to obtain a clearer "view of some of the points, and to give definite advice "with regard to their treatment." We interpret this to mean that then we may again rely upon Mr. Ibbs to give our readers the results of his investigation and deliberation over the matters treated upon in the present article, and any new points which may arise.

A Sane Decision.

THERE is only one thing that matters this week in connection with the coal crisis, and it is that the leaders of the miners consented to a postponement of the strike notices becoming operative for a week from last Saturday. Preceding this decision, the whole week was spent by the country on tenterhooks. The days passed in conferences, in which the Prime Minister took a prominent part; but each day, until Friday, ended in the same way—with a blank. There were two offers from the Government before the miners—that the wages claim of 2s. should be referred to a competent tribunal, and that the miners' leaders should have a conference at once with the coalowners to ascertain whether a scheme could be established which would fix a datum line for production from which the miners would secure higher wages for a greater output. Mr. Smillie has had a good many things written and spoken to his discredit; but it must now be said to his credit that even on Thursday he felt keenly the responsibility of his position, and then expressed the desire, at a meeting of the miners' delegates, that the Government offer should be submitted to a second ballot of the miners. In this he and those who sided with him in wishing to leave the final decision to the men were defeated by those who wanted to push forward with the dual demand. This fact must be taken into consideration when assaying how much credit is due to Mr. Smillie for the courage he displayed in being chiefly instrumental, after another strong appeal by Mr. Lloyd George on Friday, in agreeing to defer the strike notices for a week in order to confer with the coalowners to ascertain whether a wage-on-production plan could be evolved which would be acceptable to the Miners' Federation, and of general advantage to the country. After all that has passed, after the extraordinary demands that have been made, after the monumental obstinacy there has been, this attempt at finding a new basis shows that the outward display of a rebellious spirit against constitutional method does not mean that the humane spirit has been actually or entirely extinguished. What each one of us has now to hope devoutly is that the effort that is being made will be successful—that from it will emerge a scheme which will be beneficial to the country and to the miners alike. Nothing must be left undone to secure this end. Mr. Smillie, Mr. Hodges, and others have done and said many things with which other men disagree. But we must acknowledge that, if they only will, they can be powerful, while looking equitably after the interests of the miners, in well-doing for the whole country. Their responsibility is great, and so is their influence. The work of the miners is fundamental to the prosperity of the country; and recognizing this, it should be for the leaders to exercise every precaution that fairness is in what they do, and that they do not secure advantage by putting a burden of unfairness upon others. That is neither manly nor just; and, being in such responsible position, it is for the miners' leaders to act with fine circumspection. We hope the present conference will inaugurate new and lasting beneficial conditions in the coal industry. Strife has reigned far too long.

Research and the Gas Industry's Interests.

THE whole country has very good reason for being satisfied with the account of the progress and the statement of the aims and ambitions which the Advisory Council of the Department of Scientific and Industrial Research published last week. Research, at one time taken up here and there according to the degree of enlightenment and belief in it of industries, firms, and individuals, has now (so to speak) a national head, but a national head with very broad plans and objects. There is no desire on its part to create a national monopoly of research; there is no desire to interfere with or restrict research in any quarter; but there is every desire to encourage and to cause it to strike out into any and every quarter in which it is believed usefulness resides. A great deal of money from the national purse is being spent, and yet not too much in view of the nation's need for development of productive work and of economy, both of which should go hand in hand. The money placed at the disposal of the Department is being spent in direct fundamental work which aims at conserving, by putting to the most profitable use, the resources of the country. We have this typified in the Board of Fuel Research, who are undertaking work and investigating problems with which no single industry can effectively grapple. Money is being spent in the encouragement of the individual worker, particularly in pure science; and considerable grants have been made to individual investigators and students. Money is being spent in organizing Research Associations, composed of industrial firms for the co-operative investigation of their own problems—such work all being of radical importance to the national prosperity. The Advisory Council fully appreciate that their work must be to encourage, and not to destroy, self-reliance; and they also appreciate that the most profitable research is that in which science and practical experience combine for the furtherance or realization of a common end. Money is also being spent in aiding suitable research undertaken by scientific and professional bodies; and so a number of important researches have been either inaugurated or maintained by the supplementing from the national purse of the necessary funds. We have, as an industry, an example of this in the refractory materials research which the Institution of Gas Engineers and the Society of British Gas Industries have been and are jointly conducting, with Dr. Mellor in command, and in directions suggested by him and by the practical experience of the industry. Another line of the Advisory Council's activity is the direction and co-ordination of research for national purposes.

When consideration is given to the atrocious expenditure there has been of the coal resources of the country through traditionally wasteful methods of use, and the widespread destruction of valuable properties, there is no reason to wonder at a National Department of Scientific and Industrial Research seeking at the genesis of their activities to attack this basic problem by instituting a Board of Fuel Research; and they made excellent choice when they put at the head as Director Sir George Beilby, F.R.S., whose capacity and breadth of view are such that in the work he directs and supervises science and practice must have a mutual balance. Science must be applied to practice, to secure utility and economy; it must aid and not repress, or impose onerous conditions. This we believe (knowing the members of the Board) are the views that animate them. We could not, with their past individual work before us, suspect them of holding any other; and if practice proves any decision of theirs to be wrong, then they are men of such calibre that they would freely acknowledge the mistake, and withdraw from any untenable ground. The members of the Board have themselves had so much experience in the manufacturing world, that they know how frequently ideals and practicability decline, without loss is incurred, to occupy common ground, and that therefore it is better to adjust one or other to the plane where the maximum advantage can be realized and the minimum loss sustained. The use of fuel to the best possible advantage, the application of fuel to its proper purpose, and the discovery and production of new forms of fuel, open up to view vast fields of valuable work. These are problems of national importance—not problems that are confined to any particular industry; and therefore it is only equitable that they should be taken up at the cost of the national purse. The Board have an extensive programme of work before them; and the very extensiveness of it to-day condemns the neglect of the past. Take coal for example. They are going to examine into the more important types of coal, and classify them according to their suitability for the production, by different methods, of solid, liquid, and gaseous forms of fuel. Conjoined to this is the study of carbonization at different temperatures, together with the determination of the quantity and quality of the products; and the investigation will include the economics of gas production and utilization.

The Board are placing themselves in co-operation with other bodies in this work—not for the purpose of ultimately superseding them, but with the view to collaboration. For instance, they are co-operating with the Manchester Corporation in the research as to the efficiency of the domestic grate, with the Ministry of Health in experiments upon the efficiency of cooking ranges, and with other bodies in relation to the problems associated with air pollution by smoke.

It is perfectly obvious that all this work cannot proceed without the hearty co-operation of the gas industry, particularly in respect of the exploration of cooking and heating methods. The experience and practice of the industry is full of suggestion, and so is the research work of the Gas Investigation Committee of the Institution of Gas Engineers and the Leeds University. As the gas industry knows full well through the important work that has been done in the Gas Regulation Act, for which the Board of Fuel Research supplied the basis, and our own Gas Investigation Committee some of the evidence, the Board is an influential body. Just as it was influential in connection with that Act, so it will be in the future in connection with matters in which the gas industry must take a large part, and which will vitally affect its trading expansion. It must be clearly understood by all concerned that there is no intention on the part of the Board to supplant research work undertaken by the industry. But the interests of the industry lie in the direction of affording all possible help and facility to the Board, and in this its research workers can assist from their independent accumulations of knowledge, and the proofs which their work can and will progressively furnish.

It is a good story that is told by the Advisory Council regarding these initial steps in developing scientific and industrial research; and as the story of usefulness develops with time, the wisdom of establishing a Department to promote national prosperity by the aid of science will declare itself in bolder and still bolder degree. The first fruits have already been gathered; and the gas industry has shared in them. The harvest will, however, grow as the years come and go.

Benzole and Compulsory Production.

THERE seem to be a good many people occupying places in our midst who are obsessed by the belief that compulsion ought to be applied to the gas industry to do things that are in cases commercially unsound. They are loud and frequent in their insistence on this; and they would be equally loud and insistent in their protestations if anyone had the audacity to suggest that compulsion should be put upon them in relation to the conduct of their own businesses or private affairs—even though in the national interests. For instance, if all motor car owners were compelled by statute to take those unfortunate people who cannot afford motor cars of their own for health-giving outings in the country, this would be in the national interests. The promotion of health in any way is a national advantage; and this plan is one that might do a great deal to quiet the unrest that exists to-day among that class of people who think that their labour is entitled to as much reward as the capital that gives them employment. There is not the shadow of a doubt that the owners of motor cars will say that this proposal is very silly. To this we reply that it is not more so than the repeated efforts that are being made to compel gas undertakings to produce additional benzole by washing their gas, whether or not, in the individual conditions of a gas undertaking, it is a sound commercial proposition. Gas undertakings are not philanthropic institutions, carried on by ample voluntary subscriptions. It thus depends very much on the price that can be obtained for crude benzole whether or not it will pay to extract it from the gas or to leave it in. It may be that the recent rise in the price of refined benzole will enable more gas undertakings to resume production; and if users of motor vehicles would make it worth while, more concerns still might remove the benzole. It is very largely a financial question, and not merely one of arbitrary decision.

The Motor Legislation Committee, representing all the branches of the motor trade of the country, have made a report and a series of recommendations (with which they hope duly to impress the Government) on the importance of ensuring the fullest provision of home-produced motor spirit. Of the importance, there can be no question; and the objective is quite a laudable one. But the compulsory method of attaining the objective is not to our liking, unless conditions can be ensured that will fully compensate all the producers. The Committee recommend that all statutory gas companies with an annual consumption of not less than 5000 tons of coal be "compelled" to instal within a limited period the necessary plant for the production of crude benzole—that is to say, all gas-works making from about 60 million cubic feet a year would be brought within this scheme. Were this to be done, it is calculated that there would be at once available a further 30 million gallons of motor spirit annually. A "further" 30 millions! The Committee are much more sanguine than we are. Parliament has several times recently pronounced against making benzole recovery obligatory upon gas companies, because Parliament recognizes what the Motor Legislation Committee pretend they cannot comprehend, that it must be influenced by the condition whether or not it pays. Compulsory production must be accompanied by compulsory patronage at a paying price; and we have never seen this aspect of the matter dealt with in any of the recommendations made by the Motor Legislation Committee.

They know very well what benzole production is up-against in respect of both modern costs and opulent competitors, who are attempting to exercise some control over benzole by their ability to offer for strategic purposes 1d. or 2d. more per gallon of crude benzole than the National Benzole Company, Ltd. The Motor Legislation Committee suggest that the Government should take such steps as will ensure that the output of benzole is available to the public at a reasonable price, and is in no sense controlled by the leading oil companies. How can the Government prevent the oil companies exercising some measure of control except by compelling all producers to sell through the National Benzole Company? They cannot prohibit the oil companies from obtaining what possession they can of benzole. We are afraid the Motor Legislation Committee have not a very large horizon. Their conceptions are what would suit the motor industry and the users of motors; but the practicability of their ideas and plans is something over which other people must worry. The "other people" include the gas manufacturers; and they must in their corporate capacity protect themselves against being landed into a non-paying business.

The proposals of the Committee do not stop at the recommendations as to benzole. They show that they have got their knives pretty deeply into the big oil companies. They also still look with hopeful eyes to alcohol. But while the price of food stuffs containing fermentable carbohydrates remain at the present level, and the costs of labour and transport are so great, alcohol is not likely to help the motor car user to any great extent. Another recommendation is that the Petroleum Executive be asked to consider what further steps can be taken to develop oil production in this country, and how far it may be possible for the larger consumers of coal to carbonize it so that all the bye-products are recovered. The answer to this is that, unless they are carbonizers of coal for the making and marketing of a staple product such as gas or metallurgical coke, neither the Petroleum Executive nor anyone else can make it worth while for carbonization to be an economic proposition. If the Motor Legislation Committee would only study the Nitrogen Products Committee's report, they would see that carbonization is not a suggestion that steam raisers—for electricity supply, for instance—can contemplate. The Motor Legislation Committee, we fear, only regard matters from their own point of view, and not from those of other people. This may be human nature; but it is neither wise nor commercially sound. Parliament cannot legislate, and make a course of procedure obligatory, by regarding a subject from one point of view only. That is the way mistakes, and serious mistakes, are made not only in respect of this particular matter of benzole, but others—for example, in relation to inerts, minimum methane, and maximum carbon monoxide in gas.

Sharing in Technical and Economic Control.

Co-partnership does things in a much more refined way than revolutionary tactics. We have seen quite a dramatic piece of adventure in Italy lately, through the workers taking possession of the factories. Of course, no one expected they would be able to keep them; but they are only being handed back on certain conditions, one of which is that it is to be legally established that workmen will join in the technical and economic control in all factories. The details of this arrangement are to be gone into by a commission of six masters and six workmen. The workers have obtained an advance of 20 p.ct. in their pay; but when they share in economic control, they may find that this is not justified when limited production is considered. If joint control does bring about increased production, it will be very beneficial. There was, however, surely another route—and a much better one—to the same end.

"Summer Time" Extension.

We wish it were true, if the quality were better, that summer time had been extended. The extension is only by official will and proclamation, and not actually. Officially, owing to the uncertainties of the coal strike (which we are now hoping will be averted), the return from what is known as "summer" time to Greenwich time is to be postponed to Oct. 25, instead of Sept. 27.

The Triple Alliance.

Many people do not appear to know much of the Triple Alliance, which shows that they do not take much heed of movements which have a far-reaching importance in current affairs. They ask what are the powers, objects, and limitations (if any) of the Triple Alliance. The alliance was formed in 1913 between the miners, railwaymen, and transport workers, for offensive and defensive purposes in respect of any national crisis, any wage movement, or any other issue in which one or other of the bodies is involved. The Triple Alliance was founded on the principle that not only is union strength, but that the larger the union the greater the strength. The shrewd leaders had seen that even more powerful than sympathetic strikes were synchronized strikes, with their power to paralyze the whole country. We need not here go into the points of constitution of the Alliance; but at this juncture it may be interesting to readers to know that it represents a membership of close upon 2 millions: Miners, 964,000; railwaymen, 530,000; transport workers, 350,000. The total strength of the workers in the mining industry is 1,200,000; but of these (as seen) less than a million are in the Miners' Federation, and consequently subject to the dictates of the Triple Alliance. The Alliance as a body has no funds; its business is only to decide policy. As to the funds of the constituent parts of the Alliance, despite the optimistic reports of trade union officials, it is known they are sadly depleted, and unable to stand the strain of a prolonged strike. If the miners do not object to the big difference between strike pay and current wages or cost of living, the miners' total funds might last three weeks if all realizable; the engineers' funds, two weeks; and the transport workers' funds, under three weeks. The Yorkshire miners have not recovered from the strike they indulged in last year, and are very short of cash. The South Wales men recently decided by ballot to double their contributions for strike pay. The railway strike last year deprived the railway unions of the wherewithal for supporting their members even on limited strike pay for more than a brief period. If there is a strike, it will not be long before the men will be kicking over the traces (spurred on by their wives) with only the strike pay dole coming in. The Unions will not harm the country without harming themselves; and the pool of profit from foreign sold coal (from which the miners were hoping to draw their increase of pay) will vanish with the funds of their Unions. A more foolish position leaders never occupied.

Oil Production and Consumption.

To the many useful reports issued by the United States Bureau of Mines is added one on oil production and consumption in the States during the past six months. The yield of refined products during the period was (the figures for the corresponding period of 1919 are given in parentheses): Gasolene or motor fuel, 2,178,281,185 gallons (1,911,152,705); kerosene, 1,120,517,007 gallons (1,045,746,955); lubricants 501,725,377 gallons (409,904,213); oil fuel and gas oil 3,934,351,177 gallons (3,591,438,916). The total motor fuel production this year is 13 p.ct. greater than twelve months ago, but the consumption has increased 28 p.ct. The market for oil fuel and gas oil is expanding; but we should like to see the figures for the two classes of oil separated, so as to have information whether the demand for oil gas is increasing or otherwise.

Explosions and Newspapers.

Explosions have an amazing attraction for the daily newspapers. Last week they reported that "great alarm" was caused in the neighbourhood of the South Suburban Gas Company's works by the explosion of a "capacious" underground tar tank. The amount of fuss that was made was not warranted by the facts; for the explosion was quite a small one, and beyond one man being rather badly burned, the Company suffered no inconvenience, and but little damage was done. The man is in hospital suffering from shock; and he is about the only person who can throw any light on how the explosion happened. It occurred at 12.45 during the dinner hour, and was all over in a couple of hours. The tank was about 30 ft. square, and 5 ft. deep, of cast iron, and appears to be undamaged. It contained spent creosote oil; and apparently some inflammable vapours on top of the oil became ignited. The explosion blew the concrete top off the tank, and set fire to the light oils on the surface. The fire burned itself out; and the fire brigade simply confined themselves to playing water on the surrounding plant. Being between the relief holder and the water-gas plant and the purifiers, the result might have been very serious, but every precaution was taken to minimize the danger.

Coal Output.

The coal output for the week ended Sept. 11 was 4,606,800 tons, compared with 4,750,000 tons the week before. Omitting holiday weeks and the railway strike week last year, over the past twelve months the 4 million ton stage has always been passed; and one week ran up to 4,910,106 tons. This was the week ended Dec. 20 last. But what a contrast between these figures and those obtaining in 1913, when fewer men were employed, and 16 or 17 p.ct. more coal was raised!

OBITUARY.

THOMAS WADDOM.

WITH tragic suddenness, the death took place last Friday of Mr. Thomas Waddom, who for over half-a-century had been connected with the Newcastle-upon-Tyne and Gateshead Gas Company. He had been in Newcastle attending a meeting of the Directors of the Company, and was returning to Hawes (where he had been spending a holiday), when, while changing trains at Northallerton, he became suddenly unwell, fell down upon the platform, and expired almost immediately.

Mr. Waddom entered the service of the Company as Collector in 1867, became Accountant in 1884, and at the end of 1896 was appointed Secretary, on the retirement of the late Mr. William Hardie, who had been Secretary from 1855. Mr. Waddom retired from the Secretaryship at the beginning of 1918, at which time he had been connected with the Company for fifty years and four months. He was not only granted a well-deserved retiring allowance, but his services and his abilities were generously recognized by his election as a Director of the Company. Mr. T. P. Ridley was, it will be remembered, appointed his successor.

In an unassuming way, Mr. Waddom did some useful work for the industry with which his whole life was thus bound up. At a conference in London during October, 1917, called to discuss the vexed question of the financial hardships of gas undertakings, Mr. D. Milne Watson, giving the names of the members of the Committee (of whom Mr. Waddom was one) who had been considering the subject, took the opportunity of acknowledging the services that had been rendered by Mr. Waddom and Mr. Ridley. They had, he said, worked extremely hard, and had got together most of the valuable statistics with regard to the industry as a whole, which had been most useful, and would continue to be so, in pursuing the matter further.

Mr. Waddom was elected President of the North of England Gas Managers' Association in May, 1914; and, owing to the outbreak of war, it was arranged twelve months later that he and the other officers should be retained in their positions for another year. It was at the October meeting that he delivered his Presidential Address, in which he demonstrated the progressive policy of the Company with which he was connected. As to the North of England Association, in addition to his services as President, Mr. Waddon did excellent work for the Commercial Section. He also took a keen interest in the British Commercial Gas Association, one of whose Trustees he was.

Well known and respected, as he was, there will be many who will miss Mr. Waddom, whose kindly thought for the welfare of the employees of his Company was often manifested—and particularly so during the war to those who were on active service. He was about 74 years of age, and unmarried.

Temporary Increase of Charges Act.—Orders made by the Ministry of Health under the Statutory Undertakings (Temporary Increase of Charges) Act, authorize the Lincoln Corporation to increase the maximum charge for gas from 4s. to 6s. per 1000 c.ft.; and the Portmadoc Urban District Council, from 6s. 6d. (under a previous Order) to 8s. 3d. per 1000 c.ft.

National Gas Council's New Postal Address.—As from to-day, the postal address of the National Gas Council and the Federation of Gas Employers will be No. 30, Grosvenor Gardens, Westminster, S.W. 1. Personal interviews will, however, continue to take place at Horseferry Road until further notice. The telephone number will remain as hitherto—"Victoria 8100."

GAS REGULATION ACT, 1920.

RULES MADE BY THE BOARD OF TRADE WITH RESPECT TO APPLICATIONS FOR ORDERS UNDER SECTION 1 OF THE GAS REGULATION ACT, 1920 (10 AND 11 GEO. V., Ch. 28).

I.

Application to the Board of Trade for an Order under section 1 of the Gas Regulation Act, 1920, may be made to the Assistant Secretary, Power, Transport, and Economic Department, Board of Trade, Great George Street, London, S.W. 1.

II.

The application shall state the standard or maximum price or prices per therm which the undertakers applying for the Order (hereinafter called "the undertakers") propose should be substituted (in accordance with the provisions of sub-section (3) of section 1 of the Act) for the standard or maximum price or prices per 1000 c.ft. authorized by the statutory or other provisions affecting the charges which may be made by the undertakers.

III.

The application shall be accompanied by the following documents:

(*a*) A schedule (in triplicate) in the prescribed form,* showing in detail the cost to the undertakers of supplying gas for the periods specified in the form, and a copy of the published accounts of the undertakers for the specified periods, together with a statement of the price or prices charged for gas during each of those periods.

(*b*) A list of the enactments and other provisions requiring the undertakers to supply gas of any particular illuminating or calorific value.

(*c*) A list of the statutory and other provisions affecting the charges to be made by the undertakers.

IV.

(1) Notice of the application shall be published in the "London," "Edinburgh," or "Dublin Gazette," as the case may be, and in at least one newspaper circulating within the limits of supply of the undertakers, and shall also be served on the local authority. For the purposes of these rules, the expression "local authority" shall mean every county, county borough, and urban district council, the whole or any part of whose area is within, or partly within, the limits of supply of the undertakers. Where any portion of the City of London is within such limits, the notice shall also be served on the Common Council of the City of London.

(2) The notice shall state the standard or maximum price or prices per 1000 c.ft. authorized by the enactments and other provisions relating to the undertakers, and the prices per therm which the undertakers propose should be substituted therefor.

(3) The notice shall also state that a copy of the application and of all the documents submitted to the Board of Trade therewith may be inspected, free of charge, at the office of the undertakers within the limits of supply during office hours, that representations with regard to the application may be made to the Board of Trade before a date to be fixed in the notice, which shall be not less than 21 days after the date on which the publication and service of the notice will be completed, and that a copy of such representations must at the same time be sent to the undertakers. The notice served on the local authority shall also state that a copy of the application and of all the documents submitted to the Board of Trade therewith may be obtained at the office of the undertakers on payment of the usual charges for copying.

(4) As soon as possible after the publication and service has been completed, a marked copy of the "Gazette" and newspaper containing the notice, and a certified copy of the notice served on the local authority, endorsed with a list of the councils on which it has been served and the date of service, shall be forwarded to the Board of Trade.

V.

After the date mentioned in the notice, the undertakers shall furnish to the Board of Trade their observations on any representations which have been made in accordance with the foregoing Rule IV. (3), and shall send a copy of such observations to the local authority or person making the representations.

VI.

The fee payable in connection with an application shall be as specified in the schedule to these rules, and a cheque for the appropriate amount, made payable to the Assistant Secretary for Finance, Board of Trade, should accompany the application. In addition, any extraordinary expenses incurred by the Board of Trade in connection with a local inquiry into the application or otherwise will be payable by the undertakers.

(Signed) H. F. CARLILL,
Assistant Secretary to the Board of Trade.

Board of Trade,
Sept. 28, 1920.

SCHEDULE.

SCALE OF FEES FOR ORDERS UNDER SECTION 1 OF THE GAS REGULATION ACT, 1920.

Where the undertakers supplied during the last complete year ended Dec. 31:

Up to 100,000,000 c.ft. of gas	£10
100,000,000 c.ft. and less than 500,000,000 c.ft.	£20
500,000,000 c.ft. and over	£30

* Copies of the prescribed form of schedule and of model forms of application and notice may be obtained from the Assistant Secretary, Power, Transport, and Economic Department, Board of Trade, Great George Street, London, S.W. 1.

Lignite for Gas Making.

Of possible substitutes for gas oil or bituminous coal, says Mr. W. D. Wilcox, the President of the Idaho Gas Company, lignite is the most abundant and widely available. The most serious departure from standard quality in the lignite gas results from the presence of from 8 to 15 p.ct. of carbon dioxide, as against perhaps 4 p.ct. in a good quality coal gas. In an article appearing in the Chicago "Gas Record," Mr. Wilcox remarks that this carbon dioxide is an inert and a diluent; and because of its high specific gravity, it increases substantially the cost of transmission of a unit fuel value. It acts as an absorbent and a vehicle for the carrying-away of a substantial part of the sensible heat generated when the gas is burned, and thus reduces its efficiency in use. It can be removed by lime; but experience seems to show that the cost of removing the carbon dioxide in this way is greater than the increase in value given to the gas. He suggests a pre-drying of the lignite, which brings its composition nearer to that of bituminous coal. It can be safely assumed that lignite may be heated to 400° Fahr. without material loss of combustible gas; and in bringing it to this temperature, nearly all the moisture will be driven off, together with much of the combined oxygen. If the pre-drying were carried out at the mine, the saving in cost of carriage should more than cover the cost of the operation. If, however, the drying were done at the gas plant, it could be effected by using the hot waste gases from the flues of the bench, drawn by suction through the drying apparatus, in direct contact with the lignite. Using a material from which most of the moisture and combined oxygen has been removed, it will be possible to maintain a much higher temperature at the inner surface of the retort walls during the generating period, so that the combined oxygen will come off predominantly as carbon monoxide, and the percentage of dioxide will be reduced to that ordinarily found in standard coal gas. A much smaller weight of charge will be put into the retorts for a given production of gas, and a smaller quantity of bench fuel will be required; so that the pre-drying, instead of being an added expense, is likely to prove an economy. The gas should be about 550 B.Th.U.

Fuel Economy Scheme of the Federation of British Industries.—Examples have now been given of the valuable assistance being rendered to members of the Federation through the operation of the fuel economy scheme, under the Technical Assistant (Mr. G. W. Andrew, M.Sc., F.I.C.). One inquiry had reference to the efficiency of a gas-fired annealing furnace. The plant had been inspected while it was opened-up for examination. Certain modifications of design were suggested; but before making a final report, it was decided that the plant should be inspected when in operation, and further essential working results obtained. Another point was as to the use of cinders from coal-fired furnaces in gas-producers. The preliminary data were examined; and definite recommendations were made. In this case the question of the gas produced was of extreme importance; and in order to obviate any prejudicial effect on the products, it was agreed that a detailed analysis of the gases should be made. Prof. Bone (the Chairman of the Committee) arranged for the loan of apparatus during the trial period of the scheme; and the tests and necessary analyses will be carried out personally by Mr. Andrew.

The sixth annual dinner of the Coke-Oven Managers' Association is to take place at the Queen's Hotel, Leeds, on Saturday, Oct. 16.

A visit by members of the Manchester and District Junior Gas Association to the Stretford Gas-Works has been arranged for next Saturday, where tea will be provided by Mr. H. Kendrick, the Engineer and Manager. Afterwards Mr. J. H. Dawe will read a paper on the subject of the efficiency of domestic cooking appliances.

The autumn meeting of the North of England Gas Managers' Association will be held at the West Hartlepool Gas-Works on Friday, Oct. 8, at 2.30. Mr. Arnold W. Branson (the President) will deliver his address; and Mr. T. P. Ridley will contribute some "Notes on the Gas Regulation Act." The meeting is to be followed by a visit to the pumping-station of the Hartlepool Gas and Water Company, where tea will be provided on the invitation of the Directors.

THE ADVISABILITY OF ADOPTING A DEFINITE FRACTION OF A PENNY AS THE BASIS IN CHARGING FOR HEAT UNITS.

THE EFFECT ON THE SLIDING SCALE.

By HERBERT E. IBBS, Accountant to the Gas Light and Coke Company, and Editor of "Field's Analysis."

Now that the Gas Regulation Act has come into being, with its great advantages to the industry as a whole, gas officials are one and all busy with the thought of the necessary changes that will have to be made in some of the present well-established methods. In none of these, perhaps, will the change be so marked or of such a sweeping character as in the case of charging for gas consumed according to its thermal contents, instead of by cubic feet.

Unfortunately, the change-over in system is not a complete one. Were it so, the difficulties that will henceforth accompany the new method would speedily disappear. As it is not possible to measure directly the thermal units consumed, the basis of cubic feet will remain. This involves double-handling—a process which is always objectionable to a practical mind. As the translation from cubic feet to therms will have to be continually undertaken, it is of vital importance that the method should be as simple as possible; and any means that will help in this direction will, therefore, be of general interest. It is with this object that the writer has been approached to give his views, more especially in regard to the possibility of producing a handbook that would prove useful without being cumbersome.

If more could be known at this juncture of the way in which matters will eventually be settled, it would be possible to say whether or not the task is at all practicable. For instance, it is necessary to know the extent of the area that will be covered by the different descriptions of calorific values chosen by undertakings under the Act. Will the range be confined in practice to only four or five different descriptions of calorific value or will it run (say) from 400 to 600 B.Th.U. by multiples of five? In the latter case, no less than forty-one different tables would be required for quality alone.

Another point which will have a great bearing on the question is whether use will be made of one, two, or even more places of decimals in stating therm prices. With regard to this question, it is hoped that for the sake of simplicity a limit will be placed upon the fraction of a penny to be used in all cases. The farthing has been mentioned; but one-fifth of a penny, which could be expressed as 0·2, would seem the more desirable, as it involves only one decimal.

Moreover, movements of one-fifth of a penny per therm would rarely amount to an alteration in the actual price per 1000 c.ft. of more than one penny, as the calorific power of the gas that is being supplied would have to be over 500 B.Th.U. for this to be so; whereas the farthing per therm would in most cases exceed a penny, as the majority of undertakings, it is imagined, will supply gas of more than 400 B.Th.U. in quality. Unless some definite fraction of a penny is adopted, we may possibly have prices moving by fractions of (say) 0·01 of a penny, and a complete handbook in this case would be entirely out of question. Each undertaking would be left to produce its own set of scales according to its particular requirements. Were the industry to adopt, in the main, only a small range of calorific values, and were the smallest unit of price to be one-fifth of a penny, it would be possible to produce tables in a comparatively moderate space, as can be gauged by Table I.

As questions are bound to arise as to the effect of the change-over to therms in the case of the prepayment meters, a table is given herewith which shows how, in a simple and concise form, a scale may be made up.

There will be many cases where an adjustment has to be made on account of the meters being set to give less gas than is due for the penny, and a column has, therefore, been included showing how this may be dealt with. The price in the example given in Table II. is on the basis of a 500 B.Th.U. gas at 4s. 8d. per 1000 c.ft., *plus* 10d. for fittings, &c.—the meters being set to give

TABLE I.

Scale of Charges for Gas of 475 B.Th.U. per Cubic Foot at 11·8d. per Therm (the nearest equivalent in multiples of one-fifth of a penny to 4s. 8d. per 1000 cubic feet).

Cubic Feet.	Therms	Amount. £ s. d.	Cubic Feet.	Therms	Amount. £ s. d.	Cubic Feet.	Therms	Amount. £ s. d.
100	·5	0 0 6	5,100	24·2	1 3 10	10,500	49·9	2 9 1
200	·9	0 0 11	200	24·7	1 4 3	11,000	52·2	2 11 4
300	1·4	0 1 5	300	25·2	1 4 9	11,500	54·6	2 13 8
400	1·9	0 1 10	400	25·6	1 5 2	12,000	57·0	2 16 1
500	2·4	0 2 4	500	26·1	1 5 8	12,500	59·4	2 18 5
600	2·8	0 2 9	600	26·6	1 6 2	13,000	61·7	3 0 8
700	3·3	0 3 3	700	27 1	1 6 8	13,500	64·1	3 3 0
800	3·8	0 3 9	800	27·5	1 7 0	14,000	66·5	3 5 5
900	4·3	0 4 3	900	28·0	1 7 6	14,500	68·9	3 7 9
1000	4·7	0 4 7	6,000	28·5	1 8 0	15,000	71·2	3 10 0
100	5·2	0 5 1	100	29·0	1 8 6	16,000	76·0	3 14 9
200	5·7	0 5 7	200	29·4	1 8 11	17,000	80·7	3 19 4
300	6·2	0 6 1	300	29·9	1 9 5	18,000	85·5	4 4 1
400	6·6	0 6 6	400	30·4	1 9 11	19,000	90·2	4 8 8
500	7·1	0 7 0	500	30·9	1 10 5	20,000	95·0	4 13 5
600	7·6	0 7 6	600	31·3	1 10 9	21,000	99·7	4 18 0
700	8·1	0 8 0	700	31·8	1 11 3	22,000	104·5	5 2 9
800	8·5	0 8 4	800	32·3	1 11 9	23,000	109·2	5 7 5
900	9·0	0 8 10	900	32·8	1 12 3	24,000	114·0	5 12 1
2000	9·5	0 9 4	7,000	33·2	1 12 8	25,000	118·7	5 16 9
100	10·0	0 9 10	100	33·7	1 13 2	26,000	123·5	6 1 5
200	10·4	0 10 3	200	34·2	1 13 8	27,000	128·2	6 6 1
300	10·9	0 10 9	300	34·7	1 14 1	28,000	133·0	6 10 9
400	11·4	0 11 3	400	35·1	1 14 6	29,000	137·7	6 15 5
500	11·9	0 11 8	500	35·6	1 15 0	30,000	142·5	7 0 1
600	12·3	0 12 1	600	36·1	1 15 6	31,000	147·2	7 4 9
700	12·8	0 12 7	700	36·6	1 16 0	32,000	152·0	7 9 6
800	13·3	0 13 1	800	37·0	1 16 5	33,000	156·7	7 14 1
900	13·8	0 13 7	900	37·5	1 16 10	34,000	161·5	7 18 10
3000	14·2	0 14 0	8,000	38·0	1 17 4	35,000	166·2	8 3 5
100	14·7	0 14 5	100	38·5	1 17 10	36,000	171·0	8 8 2
200	15·2	0 14 11	200	38·9	1 18 3	37,000	175·7	8 12 9
300	15·7	0 15 5	300	39·4	1 18 9	38,000	180·5	8 17 6
400	16·1	0 15 10	400	39·9	1 19 3	39,000	185·2	9 2 1
500	16·6	0 16 4	500	40·4	1 19 9	40,000	190·0	9 6 10
600	17·1	0 16 10	600	40·8	2 0 1	41,000	194·7	9 11 5
700	17·6	0 17 4	700	41·3	2 0 7	42,000	199·5	9 16 2
800	18·0	0 17 8	800	41·8	2 1 1	43,000	204·2	10 0 10
900	18·5	0 18 2	900	42·3	2 1 7	44,000	209·0	10 5 6
4000	19·0	0 18 8	9,000	42·7	2 2 0	45,000	213·7	10 10 2
100	19·5	0 19 2	100	43·2	2 2 6	46,000	218·5	10 14 10
200	19·9	0 19 7	200	43·7	2 3 0	47,000	223·2	10 19 6
300	20·4	1 0 1	300	44·2	2 3 6	48,000	228·0	11 4 2
400	20·9	1 0 7	400	44·6	2 3 10	49,000	232·7	11 8 10
500	21·4	1 1 1	500	45·1	2 4 4	50,000	237·5	11 13 6
600	21·8	1 1 5	600	45·6	2 4 10	60,000	285·0	14 0 3
700	22·3	1 1 11	700	46·1	2 5 4	70,000	332·5	16 6 11
800	22·8	1 2 5	800	46·5	2 5 9	80,000	380·0	18 13 8
900	23·3	1 2 11	900	47·0	2 6 3	90,000	427·5	21 0 4
5000	23 7	1 3 4	10,000	47·5	2 6 8	100,000	475·0	23 7 1

TABLE II.—AUTOMATIC METER SCALE.

Price of Gas 5s. 6d. per 1000 c.ft. or 1s. 1·2d. per therm for 500 B.Th.U. Gas.

Cubic Feet.	Therms.	Amount. s. d.	Refund when Meters are Set at 14 c.ft. per Penny. d.	Cubic Feet.	Therms.	Amount. s. d.	Refund when Meters are Set at 14 c ft. per Penny. d.
20	·1	0 1	0	1020	5·1	5 7	6
40	·2	0 3	0	40	·2	5 9	6
60	·3	0 4	0	60	·3	5 10	6
80	·4	0 5	0	80	·4	5 11	6
100	·5	0 7	1	1100	·5	6 1	6
20	·6	0 8	1	20	·6	6 2	6
40	·7	0 9	1	40	·7	6 3	6
60	·8	0 11	1	60	·8	6 5	6
80	·9	1 0	1	80	·9	6 6	6
200	1·0	1 1	1	1200	6·0	6 7	7
20	·1	1 3	1	20	·1	6 9	7
40	·2	1 4	1	40	·2	6 10	7
60	·3	1 5	1	60	·3	6 11	7
80	·4	1 6	2	80	·4	7 0	7
300	·5	1 8	2	1300	·5	7 2	7
20	·6	1 9	2	20	·6	7 3	7
40	·7	1 10	2	40	·7	7 4	7
60	·8	2 0	2	60	·8	7 6	7
80	·9	2 1	2	80	·9	7 7	7
400	2·0	2 2	2	1400	7·0	7 8	8
20	·1	2 4	2	20	·1	7 10	8
40	·2	2 5	2	40	·2	7 11	8
60	·3	2 6	2	60	·3	8 0	8
80	·4	2 8	3	80	·4	8 2	8
500	·5	2 9	3	1500	·5	8 3	8
20	·6	2 10	3	20	·6	8 4	8
40	·7	3 0	3	40	·7	8 6	8
60	·8	3 1	3	60	·8	8 7	8
80	·9	3 2	3	80	·9	8 8	9
600	3·0	3 4	3	1600	8·0	8 10	9
20	·1	3 5	3	20	·1	8 11	9
40	·2	3 6	3	40	·2	9 0	9
60	·3	3 8	4	60	·3	9 2	9
80	·4	3 9	4	80	·4	9 3	9
700	·5	3 10	4	1700	·5	9 4	9
20	·6	4 0	4	20	·6	9 6	9
40	·7	4 1	4	40	·7	9 7	9
60	·8	4 2	4	60	·8	9 8	10
80	·9	4 3	4	80	·9	9 9	10
800	4·0	4 5	4	1800	9·0	9 11	10
20	·1	4 6	4	20	·1	10 0	10
40	·2	4 7	5	40	·2	10 1	10
60	·3	4 9	5	60	·3	10 3	10
80	4	4 10	5	80	·4	10 4	10
900	·5	4 11	5	1900	·5	10 5	10
20	·6	5 1	5	20	·6	10 7	10
40	·7	5 2	5	40	·7	10 8	11
60	·8	5 3	5	60	8	10 9	11
80	·9	5 5	5	80	·9	10 11	11
1000	5·0	5 6	5	2000	10·0	11 0	11

14 c.ft. of gas for 1d., which is equal to a price of 5s. 11¾d.; the adjustment, therefore, being to the extent of 5³d. per 1000 c.ft.

It is possible that the translation of the charge for fittings, &c., may be made on the basis of whatever figure is accepted by the authorities as the calorific power of the gas supplied prior to the war; and, if so, an undertaking will not obtain the full charge for every 1000 c.ft. of gas supplied, should it elect to reduce its calorific standard below that prevailing prior to the war. Thus:

Charge for fittings, &c., per 1000 c.ft.	10d.
Calorific value of gas supplied prior to the war .	500 B.Th.U.
Relative charge per therm	2d.
Lower calorific value gas now to be supplied .	450 B.Th.U.

2d. × 4·50 = 9d., as against 10d. obtained previously for each 1000 c.ft. of gas supplied.

It is obvious, of course, that there would be no loss of revenue were the same number of B.Th.U. consumed as in the past; but this could only come about by the consumption of a correspondingly larger number of cubic feet—an event which may not necessarily follow.

Sliding-Scale.

It would be as well to examine the question of the arbitrary adoption of a definite fraction of a penny in charging for gas consumed in its relationship to the sliding-scale. Much will, of course, depend upon the method by which the standard price and the penny which regulates the slide dividend will be converted from terms of 1000 c.ft. into therms. Here, again, the fifth of a penny would seem to be the more adaptable fraction, as it is exactly in accordance with a 500 B.Th.U. gas; and possibly the variations that would be required when adjusting for descriptions of gas other than 500 B.Th.U. would not be so material as in the case of the farthing which applies exactly to a 400 B.Th.U. gas so far as the penny per 1000 c.ft. is concerned. When charging on the basis of cubic feet sold, the penny has always been adopted as the unit; and all reference in sliding-scales has regard to movements of a penny per 1000 c.ft.—a certain percentage of dividend being accorded therefor, either by way of increase to or decrease from the standard dividend, as the case may be. It is, of course, quite possible to maintain the percentage of slide dividend as at present. But this means that the penny per 1000 c.ft. must in every case be translated into an actual therm price according to the particular calorific value of the gas that is being supplied. For instance, if the calorific value is 475 B.Th.U. per cubic foot, a penny per 1000 c.ft. must be divided by 4·75, as this is the number of therms in 1000 c.ft. of gas of that quality. This would give a result of 0·2105 of a penny per therm; and consequently, if the selling price is altered to this extent, the equivalent penny per 1000 c.ft. allows of the slide dividend being paid that is at present stated in the particular Special Act. Should, however, a fraction of 0·2 of a penny be used as an arbitrary movement in price, it is obvious that the slide dividend must be adjusted proportionately.

If a price of 0·2105 of a penny per therm is equal to 1d. per 1000 c.ft., a price of 0·2d. per therm would naturally only equal 95 p.ct. of a penny per 1000 c.ft., and a slide dividend of 2s. 6d. p.ct., for each penny change in price would have to be adjusted to 2s. 4·5d. p.ct.

There is bound to be a certain amount of difficulty in dealing with the odd portions of a penny that will come into play at some point or other with almost any calorific value that is declared; and it is suggested that an adjustment of the slide dividend would provide the simplest method.

Summary.

To sum up, therefore, if it is decided that selling prices per therm should take the form of an exact translation from so many pence per 1000 c.ft.—involving as it would, in most cases, the use of at least two places of decimals—the slide dividend would remain as at present. If, however, for the sake of simplicity in the direction where it is most required, movements in prices are confined to easily-handled fractions of a penny, the only adjustment needed would be for the slide dividend.

Table III., which can easily be understood, gives an example of some adjustments in the case of the adoption of either one-fifth or one-fourth of a penny as the smallest unit of variation in the price of gas per therm.

On the basis of movements in price by ·2 and by ·25 of a penny per therm respectively, the slide dividend would have to be adjusted as shown below, according to the calorific value of the gas in each case.

Note.—One-fifth of a penny per therm is equal to 1d. per 1000 c.ft. when the calorific value of the gas is 500 B.Th.U. One farthing per therm is equal to 1d. per 1000 c.ft. when the calorific value of the gas is 400 B.Th.U.

Table III.

B.Th.U.	Price per Therm Equivalent to 1d. per 1000 C.Ft.	Slide Dividend of 2s. 6d. per Cent. per Penny.	Slide Dividend of 2s. 6d. per Cent. per Penny on Basis of Price of ·2d. per Therm.	Percentage of Original Slide Dividend.	Slide Dividend of 2s. 6d. per Cent. per Penny on Basis of Price of ·25d. per Therm.	Percentage of Original Slide Dividend.
	d.	s. d.	s. d.		s. d.	
550	·182	2 6	2 9	110	3 5·2	137
545	·183	2 6	2 8·7	109	3 4·9	136
540	·185	2 6	2 8·4	108	3 4·5	135
535	·187	2 6	2 8·1	107	3 4·1	134
530	·189	2 6	2 7·8	106	3 3·7	132
525	·190	2 6	2 7·5	105	3 3·4	131
520	·192	2 6	2 7·2	104	3 3·0	130
515	·194	2 6	2 6·9	103	3 2·6	129
510	·196	2 6	2 6·6	102	3 2·2	127
505	·198	2 6	2 6·3	101	3 1·9	126
500	·200	2 6	2 6	100	3 1·5	125
495	·202	2 6	2 5·7	99	3 1·1	124
490	·204	2 6	2 5·4	98	3 0·7	122
485	·206	2 6	2 5·1	97	3 0·4	121
480	·208	2 6	2 4·8	96	3 0	120
475	·211	2 6	2 4·5	95	2 11·6	119
470	·213	2 6	2 4·2	94	2 11·2	117
465	·215	2 6	2 3·9	93	2 10·9	116
460	·217	2 6	2 3·6	92	2 10·5	115
455	·220	2 6	2 3·3	91	2 10·1	114
450	·222	2 6	2 3	90	2 9·7	112
445	·225	2 6	2 2·7	89	2 9·4	111
440	·227	2 6	2 2·4	88	2 9	110
435	·230	2 6	2 2·1	87	2 8·6	109
430	·233	2 6	2 1·8	86	2 8·2	107
425	·235	2 6	2 1·5	85	2 7·9	106
420	·238	2 6	2 1·2	84	2 7·5	105
415	·241	2 6	2 0·9	83	2 7·1	104
410	·244	2 6	2 0·6	82	2 6·7	102
405	·247	2 6	2 0·3	81	2 6·4	101
400	·250	2 6	2 0	80	2 6	100

As soon as the Board of Trade make a move in the direction of granting Orders under the new Act, it will be possible to obtain a clearer view of some of the points, and to give definite advice with regard to their treatment.

SIXTY YEARS AGO.

[From the "Journal" for September, 1860.]

Early Gas Legislation.—At the commencement of the session, there were eighteen applications to Parliament. Only a few of the Acts that were passed met with opposition; and the general tendency of legislation in those cases was favourable to gas interests. Commencing with Abergavenny, the Improvement Commissioners of the town attempted to obtain powers to enable them to compete in the supply of gas with the established proprietor of the gas-works, with whom they had entered into contracts to light the town for a thousand years. They endeavoured to prove that he had failed to perform his part of the contract by not giving an adequate supply, and that the gas was of bad quality. Mr. Samuel Hughes, the principal witness called to establish these points, with more than his usual recklessness of statement told the Committee that in a town with about 5000 inhabitants, the coke and tar return was 80 p.ct. of the sum expended in coal for the manufacture of gas; that acetate of lead will not detect 1 p.ct. of sulphuretted hydrogen; and that the bromine test of illuminating power of coal gas is capable of ready application. The services of this speculative philosopher were of little avail to the Improvement Commissioners in their designs against the proprietor of the existing works.

The Croydon Commercial Gas and Coke Company are empowered by the Act obtained this session to double their present share capital of £20,000 by the creation of shares of £5 each; also to increase their borrowing powers from £6000, the present sum, to one-fourth part of the additional capital. The dividends payable on the new shares are limited to 7½ p.ct., unless a larger dividend be necessary to make up the deficiency of former years. The maximum price for 12 sperm candle gas is to be 6s The Act gives power to the "Local Board, or any consumers of gas of the Company, not being less than five," to appoint a competent person to test the illuminating power of the gas on the Company's premises, on giving three hours' notice. There is no standard of purity specified.

Gas Consumption in Public Lamps.—We now publish the results of 37 experiments made in January, under the superintendence of Mr. Thos. Hawksley, to ascertain the actual consumption of gas in the street-lamps in Greenwich, Lewisham, and Charlton. . . . A very curious fact came to light in the course of the experiments which requires special notice. It might have been supposed, as the gas had to pass through meters to be registered, that the friction of the meters would have considerably checked the flow, and that the quantity registered would have been less than the quantity consumed when burning freely. But, on instituting a series of experiments to determine the correction to be made as compensation for the difference between the consumption of gas when lighted and when not lighted, and the friction of the meter, it was found that the quantity consumed when burning freely was not so great as when the unlighted gas passed through the burner and overcame the friction of the meter afterwards. This anomalous result, apparently so opposed to preconceived notions of the effect of resistance, was ascertained to be owing to the heating of the gas before it issued through the hot burner. The heating of the gas, of course, increases its bulk; and, the volume being increased, it requires more time to pass.

ELECTRICITY SUPPLY MEMORANDA.

THE electricity industry boasts it is an important "key" industry; so does the gas industry for the matter of that. The latter is the "key" to several other important industries, seeing that its processes separate the components of coal that so many other industries require for their sustenance and therefore maintenance. But we do not remember that the syndicalists have ever had their eyes upon the gas industry as one of the avenues along which their purposes can be served. But Lord Birkenhead, in the "Weekly Dispatch," tells us that this is actually so in the case of electricity. We are happy that the syndicalists have not hit upon the gas industry as another important avenue. That they have not done so may be intentional, inasmuch as for all we know syndicalists are the same as other people, and use gas extensively not only for light, but for heating purposes, in their homes. However, our Lord High Chancellor is extremely interesting when he writes on labour problems, and labour doings. He calls attention to the fact that M. André Tridon, a French syndicalist writer, tells his supporters how the syndicalist battle may be won. The excellent Tridon says: "The electrical industry is one of the most important industries, as an interruption in the current means lack of light and power in factories. It also means a reduction in the methods of transportation; and a stoppage of the telephone and telegraph systems. How can the power be cut off? By curtailing in the mine the output of coal necessary for feeding the machinery or dropping the coal cars on their way to the electrical plants. If the fuel reaches its destination, what is simpler than to set the pockets on fire, and have the coal burn in the yards instead of the furnaces?" These are the amiable intentions of M. Tridon. He believes in accomplishing his ends by violence. If he thought seriously over the matter, he would see that his method of "cutting off the power" could be frustrated by the simple expedients of maintaining a sufficient stock of coal, and ensuring that syndicalists were exempt from employment in the industry. But it is noticeable that, in the struggle over labour principles, electricity has figured somewhat largely; and the deprivation of the public of its services has frequently been one of the menaces of the Union leaders to attain their ends. The reason for this is probably found in the fact that electricity offers such an easy means of producing trouble to serve the nefarious ends of the enemies of the people.

The Advice of the Syndicalist.

The Way of the Extremist.

The article by Lord Birkenhead is headed "Mr. Smillie's Slaves." In it he asks whether it is only an unhappy coincidence which enables him to make the quotation from M. Tridon's writings, or is there any casual connection between the teachings of the extremists and the industrial chaos with which we are threatened? Lord Birkenhead does not answer the question; but there cannot be the slightest doubt that the seed scattered by such men finds congenial soil somewhere, though the seed be nothing but "shoddy mental floundering." We know that a large amount of the trouble of the last two years has been due to extremists, and not to genuine working men, though trade unionists. The extremists are men who desire an immediate and radical revolution in the existing economic order of society, and are not particular as to the means by which it is to be brought about, though it leads to disaster for their own constituents. These men are only using the trade unions as their instruments. As Lord Birkenhead says, the extremists are a comparatively small body; and if they worked with their own resources alone, their influence would be inconsiderable. Realizing this, they have been bold and shrewd enough to make up for their own weakness and deficiencies by capturing certain trade unions. The general body of trade unionists must now face the position to which their own blindness has brought them. There was the Penistone trouble. The Electrical Trades Union demanded that foremen should be members of the Union, which meant that a foreman should draw pay from his employers, and take orders from men under him. This is part in the revolutionary scheme. It is difficult to imagine a lot of sane men thinking of striking because a man, on becoming a foreman, ceases to be a member of the Union, believing that his functions can be better performed by absolute freedom of action. By trying to compel him to be a unionist, by trying to compel the employers to engage only unionists as foremen, is sheer despotism; and despotism is the way of the revolutionaries who are endeavouring to shape things for a catastrophe for the country, and for something worse for its workers. If they are such nincompoops as not to be able to see this is the end, and not their own betterment, then Heaven help them. But that is the direction of the drift—drift slow but sure. Take again the threat to bring the electric trains and tramways of London to a standstill because of something that happened at Penistone. It is about as childish and senseless a thing as could be imagined, and yet grown-up men were making the proposal, and were intending to take part in the plan for injuring the community in order to add one more rule to the trade union collection. Then there was the "one and indivisible claim" of Mr. Robert Smillie the other week in which he wanted to set the Miners' Federation above democratic government. Not in all these matters does electrical organization have part; but they are all of a piece with the extremist policy to which the Lord Chancellor seriously calls attention, and which seeks the wrecking of the industrial world. We wonder what the trade unionists who follow the extremists hope to find among the wreckage.

Municipal and Private Enterprise in the Power Schemes.

The Electricity Commissioners have given their decision in the matter of the competitive schemes of the Nottingham Corporation and the Derbyshire and Notts Power Company to provide super-power stations on the River Trent, on the borders of the city. Strong cases, it will be remembered, were presented by both, and superiority was claimed for both schemes by the respective sides. The Corporation have won the approval of the Commissioners; and now they will proceed with the first of three sections of their super-power station, which section will cost one-third of the estimated total cost of £1,500,000. The Commissioners in their decisions are adopting for their guidance certain principles, one of which is the co-ordination of the technical lines of electricity generation; another is what in their wisdom they consider will be to the ultimate economic advantage of the electrical division of the country in which the competing schemes are situated. In this case other considerations arise. Whether they have had due weight with the Commissioners it is not for us to say. But the competitive schemes in this instance were put forward on the one hand by a Corporation with a restricted area of supply, and on the other by a Power Company with a considerable area which they are bound to supply under statutory authorization. The Power Company, and not the Corporation, were the first in the field to take the initial steps to develop power supply on a grand scale; and very serious consideration ought to be given to development plans before allowing schemes which will in any way depreciate the pioneer work which was commenced by private enterprise at a time when the Electricity Commissioners and consolidation and co-ordination of power generating systems were not thought of. However, with only the brief announcement before us as to the judgment of the Commissioners, we have nothing upon which to go either to justify criticism or to form an opinion as to the correctness of their decision. There is no question as to the astuteness and ability of the Commissioners; but we do hope private enterprise will receive as much consideration at their hands as municipal adventure.

Consumers' Economy.

"Times are changing rapidly," we are told in the "Cooking and Heating Notes" in the "Electrical Times." The information is not new. The man would be very dull-pated indeed who had not realized the fact. One of the directions in which the times are changing, it appears, is that the public are returning to the pre-war habit of studying economy, and are reducing costs wherever possible. We agree, and are prepared to venture the opinion that, where householders have adopted electric radiators with the view of curtailing expense, they will soon wish they had put in gas-fires, and will in time, if purse economy and not waste is their objective, be making the change. This electric cooking and heating advocate thinks that electric lighting will come in for study in the first place in order to produce economy, and that the most economical lamps will be introduced. Again we agree. It is also a satisfaction to notice that our friend desires to be candid. He asserts that, in spite of the greatly increased price of electrical energy, it is doubtful whether more than 30 p.ct. of the smaller residence consumers are a paying proposition to-day. This is a sad state of affairs. Casting forward, he perceives the truth that the gradual adoption of higher efficiency lamps will make matters worse. This is not a brilliant outlook, more especially seeing that all costs in the electric service have risen considerably—not a department from capital onwards has escaped. So the wise engineer is advised to cultivate the "other uses" of electricity; and the value of the radiator is held up to admiration for the purpose. It would be an excellent compensator. But the householder will claim the right to have something to say from the point of view of cost, for growing charges will not allow electricity to be lightly adopted for heating purposes. The writer started off by talking about the householder searching for conversion that would produce economy; and he ends up by advocating what will promote uneconomy. There is something wrong with the logic of his article.

History Repeats Itself.

Time flies. It hardly seems fifteen years since the electrical exhibition at Olympia; but "Electrical Industries," by reprinting a paragraph it published on Sept. 6, 1905, assures us it is so. The paragraph pointed out that considerable interest was sure to be taken in the competition among electric-cookers at the exhibition. It also mentioned that the station engineers at that time were fully alive to the immense increase of business which would follow on the popularization of electric cooking. "It is surely in the nature of things," said our contemporary at that date, "that electrical engineers should not rest content with a partial conquest. They have already produced a system of lighting against which gas, without the aid of the incandescent lamp and the mendacious circular, can make no headway. So far their efforts to do the same in the direction of cooking and heating have not been so successful. The impression is general that electric cookers and heaters are a luxury. Their initial cost is high; they consume a considerable amount of current; and re-

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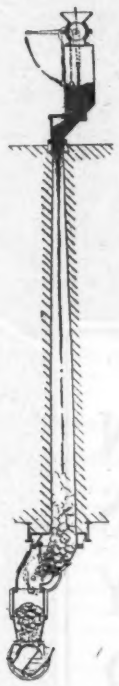

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pairs are more frequent than they ought to be. Recent improvements have, we believe, gone a long way to modify these drawbacks." Precisely the same things are being written to-day, and published in the electrical papers, as fifteen years ago. Fifteen years is a big span. Is the progress made in electric cooking and heating considered by our electrical friends equal to this span? We have no occasion to wait for the reply. There has been no suffering from atrophy on the part of the gas industry during the period. On the contrary, it has put on flesh; and the prospects are good for considerable expansion. But, fifteen years ago, the journalists of the electrical industry were boasting. They were doing so before that; they do so still. It has become chronic with them; and the gas industry moves forward.

Voltages and Admissions.

In a discussion recently, Mr. C. H. Wordingham advocated a pressure of 50 volts for domestic and other small appliances; and this has led Mr. R. J. H. Beaty to write in the "Electrical Review" on the subject of supply pressures on alternating current systems. He is a low-voltage man for domestic supply; and in his article he makes certain admissions which are not intended. In the first place, he says the 200-volt carbon filament lamp was never a success. It blackened early in life. The candle-power gradually went down, and the watts went up. The 100-volt lamp was better; but the 50-volt was better still. Then the early metal-filament lamps had to be run two in series on 200-volt circuits. Subsequently a 200-volt lamp was produced—sold at a higher price, with lower efficiency and shorter life. The gas-filled lamp is at a still greater disadvantage on 200-volt circuits. Small single-phase motors of the commutating type would be much cheaper, more reliable, and more easily repaired if wound for 50 instead of for 200 to 250 volts. The "Dictaphone" motor, for example, is wound for 20 volts, so when it was used on a 250-volt circuit, 20 volts are utilized and the odd 230 volts are dissipated in the resistance. Mr. Beaty does not stop there. A pressure of 200 volts is not safe. It is more than twenty years since a youth was killed through "larking" with a lamp bracket in a lavatory. The excuse was made that "he must have had a weak heart, and the floor was unusually damp." There have been similar cases since. But surely, says the critic of high voltages, the industry is now so well established that we can afford to drop these weak excuses, and face the facts. However, there is no need to have a dangerous pressure on lighting fittings or small appliances of any kind. The use of a compensator or auto-transformer does not ensure safety. It is far better to use a double-wound transformer, and have the house wiring, or, at any rate, the sub-circuits, entirely insulated from the mains. There is much more in the article; but this is sufficient.

American Gas Association and Sales Organizations.

The method of remuneration of salesmen is dealt with in a report by a Sub-Committee of the Commercial Section of the American Gas Association, prepared for the annual convention to be held in New York next month. It is the belief of the Committee that any system of payment for district salesmen should be based upon the following considerations: First, that a salesman should be paid a salary or drawing account sufficient to cover his living expenses; secondly, he should be paid both for the commercial transaction of selling the appliance and for the sale of the gas consumed by the appliance; thirdly, the operation of the system should be so elastic as to show the actual recompense for results secured; and, fourthly, the system should place the salesman on his honour, and at the same time force him to do effective work, without excessive supervision and voluminous reports, records, &c., which add largely to selling expenses. Against his drawing account or salary, there should be credited a fixed commission on the sale price of each appliance sold, and a fixed number of points based on the estimated annual gas consumption of the appliance for the first year. In different situations, commission values probably should range from 5 to 15 p.ct. of the actual sale price, and from 2 c. to 5 c. per 1000 c.ft. of estimated annual consumption for the first year. At the end of the month, the total amount of commissions and points for appliances installed through orders taken by the salesman should be credited against his drawing account or salary for the month, and the excessive amount of credit over salary received should be paid him. If the total credit is less than the salary, the deficit should be made good during the next or following months, before any additional credit over salary is paid him. This system has been found largely to increase the efficiency of salesmen, compared with methods that were formerly in use.

Bye-Product Gas for Another American Town.—An agreement has been come to under which the City of Birmingham (U.S.A.) is to receive from 2 to 7 million c.ft. of gas per day from the Sloss-Sheffield Steel and Iron Company; and the Birmingham Railway, Light, and Power Company will immediately proceed with the laying of mains to convey the gas from the steel works to the existing distribution system in the city. This work will cost $300,000. The contract is for three years, with the privilege of a seven-year renewal. The bye-product gas to be furnished has a calorific power of at least 500 B.Th.U.

SCIENTIFIC AND INDUSTRIAL RESEARCH.

Fifth Annual Report of the Committee of the Privy Council.

A REVIEW of the work which has been done during the five years that have passed since the inception of the scheme for the organized encouragement by the State of scientific and industrial research, is given in the introduction to the report for the year 1919-20 of the Advisory Council of the Committee of the Privy Council for Scientific and Industrial Research, published last week by H.M. Stationary Office, and purchasable [price 1s. net] at Imperial House, Kingsway, W.C., and the various branches.

The review is, however, prefaced by the report of the Committee of the Privy Council which states that the Fuel Research Board have made steady progress with the work undertaken at the East Greenwich Research Station; and attention is drawn to the most recent report of the Board on the subject, which was fully dealt with in the issues of the "JOURNAL" for April 27, May 4, and May 11. Provision has been made in the estimates for 1920-21 of £40,882 for the fuel research station, towards which various receipts are expected to produce £3500. The National Physical Laboratory have been able to devote more time during the past year to the fundamental work in standardization and research which had to be abandoned during the war, but is vital to continued progress in industry. The actual expenditure last year was £152,498; and a sum of £203,000 has been provided for the service of the laboratory during the current year, towards which a substantial amount will be forthcoming from testing fees and charges for special investigations. The number of Industrial Research Associations at present connected with the Department is eighteen, which is more than twice the number a year ago. The position of the £1,000,000 fund from which grants are made to the Associations is explained. In the year under review, twelve patents have been applied for by the Trust, in connection with the respective inventors, and two have been abandoned. Since the date of the last report grants have been made in aid of twenty scientific investigations conducted by other bodies. These include: Refractory materials, the Institution of Gas Engineers; atmospheric pollution, the Committee for the Investigation of Atmospheric Pollution; domestic heating and ventilating, the Manchester City Council. Allowances were made to a number of students under training in research and to workers acting independently or as assistants, as well as to scientific workers of standing to enable them to employ assistants or to purchase equipment. The total expenditure of the Department during the financial year was £330,176.

To the Advisory Council four new members were added during last year; the total number being now eleven, including the Administrative Chairman (Sir William S. M'Cormick, LL.D.) and Sir George T. Beilby, F.R.S. (Director of Fuel Research). One of the new members is Prof. Sir John Cadman, K.C.M.G., the Adviser to the Petroleum and Coal Mines Departments of the Board of Trade. In the review contained in their report, the Advisory Council divide up their programme under four main heads, and then set forth what has been done in each of these spheres. The four heads are: The encouragement of the individual research worker, more particularly in pure science; the organization of national industries into co-operative research associations; the direction and co-ordination of research for national purposes; and the aiding of suitable researches undertaken by scientific and professional societies. Particulars are given of the grants made; and it is noted that the great majority of these have been for work in the fundamental sciences, and that in these cases no conditions are attached either as to the line of work to be pursued or as to the use to be made of the results. As to Research Associations, negotiations are now proceeding for the establishment of further bodies of this character.

THE FUEL RESEARCH BOARD.

From the third section, on the conduct and co-ordination of national research, the following may be quoted:

> When we began making our plans for the organization of the industries of the country for scientific research, it became evident to us that if the scheme for co-operative research in the several industries were to be a permanent success, provision must also be made for dealing with certain fundamental problems which were of such wide application that no single industry, however intelligent or highly organized, could hope to grapple with them effectively.
>
> *Fuel a Basic Problem.*
>
> The first of these basic problems was fuel. In this country, coal is, and must remain, the principal source of heat, light, and power, without which no modern industry is possible. But the right or wrong use of coal affects not only every industry, it has an intimate bearing, through the navy, the air force, and even through the army, upon the national defence, and it directly influences the comfort, health, and general well-being of every man, woman, and child in the land. The use of fuel to the best possible advantage, the application of each available kind of fuel to its appropriate purposes, and the discovery and production of new forms of fuel, are obviously national problems, and as such can most equitably be attacked at the cost of the taxes to which each of us contributes in his degree. Special aspects of these large questions may properly be entrusted to particular localities or to individual industries or firms; but the wider problems seemed to us to be clearly matters for the State. We therefore recommended the establishment of a special organization for the purpose; and the Fuel

Research Board was appointed, under the directorship of Sir George Beilby, F.R.S.

Establishment and Aims of the Fuel Research Board.

Soon after its establishment in 1917, the Fuel Research Board put before the Lord President a programme of research work which included the erection of a fuel research station at East Greenwich. A full description of the station and of the work on which it is engaged is given in the recently published report of the Fuel Research Board for the years 1918-19, from which it will be seen that provision has been made for the examination of the more important types of coal from all parts of the United Kingdom and their classification according to their suitability for the production of gaseous, liquid, and solid forms of fuel by various systems of carbonization and gasification. This classification involves the study of the carbonization of coals at temperatures ranging from 500° C. to 1300° C., under various conditions of time, temperature, and mass, and the determination of the quantities and qualities of the gaseous liquid, and solid products of carbonization and gasification under accurately ascertained and recorded conditions. In this way, trustworthy data are being obtained for the use of technical experts and manufacturers who are seeking to replace crude methods of using coal by more efficient and economical methods. The programme submitted in 1917 was naturally colored by the fuel situation as it then was. During the past three years this situation has definitely developed in ways which were only vaguely anticipated at the outset; and in response the Board have felt it their duty to widen and extend the scope of their work to keep abreast with these developments.

"Gas Standards" and the Development of the Gas Industry.

The inquiry of the Board into "Gas Standards" opened-up the whole question of the future of the gas industry, which deals with 20 million tons of coal per annum. The adoption of a new method of charging for gas based directly on the thermal units delivered to consumer was recommended by the Board, because from the national point of view it opens-up new possibilities of economy in the production of thermal units in the form of gas. It also opens the way for the absorption by gas undertakings in certain districts of coke-oven gas, much of which is at present wasted. In both these directions the coal resources of the nation will be conserved, while the existing gas undertakings will be put in a position to supply increased quantities of gas, and thereby meet the needs of new classes of consumers without increasing their demands on the supplies of coal. The Board realized that for these developments trustworthy data as to the economics of gas production by new methods would be required; and it was decided to add to the outfit of the research station which was then in course of erection, a setting of continuous vertical retorts, so that data on the production of additional thermal units in the form of gas by the use of steam in these retorts could be obtained. This addition to the equipment of the station was planned early in 1917; and the contract for the erection of the retorts was placed in June of that year. They were completed at the end of 1919; and a series of experiments is now in progress, the results of which to date fully justify the anticipations as to the value of the data which would be obtained.

Peat as a Source of Fuel.

From the outset, the Board has been pressed to deal with peat as a source of fuel. As much of this pressure came from Ireland, an Irish Peat Inquiry Committee, under the chairmanship of Sir John Purser Griffith, was appointed to make a preliminary investigation of the subject, more particularly from the Irish point of view. The findings of the Committee and other important documents bearing on this aspect of the problem are now in the press. But the Board had to look at the question from a wider point of view; and after the Committee had presented their report, Prof. Pierce Purcell, who had acted as Secretary to the Committee, was appointed Peat Investigation Officer to the Board. Under his supervision experimental work on machine-cutting and winning of peat has been in progress during the past eighteen months.

Pulverized Fuel.

The reports which reached the Board in 1917 of the rapid extension of the use of pulverized coal in the United States led them to make arrangements with Mr. Leonard Harvey to supply the Department with a full report of his visit of inspection to the leading works in the United States, at which the most modern systems for the use of pulverized fuel were in use. This report was published for the information of users of fuel in this country, and has been so widely circulated that a second edition is now in preparation. The Board decided to instal at the station a small pulverizing plant of the latest design, so that the suitability of various types of coal for this purpose might be tested. Further work in this direction is at present under consideration.

Possibilities of Power Alcohol.

The Board have been entrusted with the establishment of a small, permanent organization to continue investigations into problems of the production and utilization of alcohol for power and traction purposes. They propose to begin by bringing the work already being done, both as regards production and utilization of alcohol, into proper focus; and the Lord President has approved the appointment of Sir Frederic Nathan as Power Alcohol Investigation Officer.

The Fuel Research Board as Collaborators and Advisers.

Before and during the earlier years of the war, the Director of Fuel Research had been in close touch with the Admiralty and Ministry of Munitions on the question of increasing the supply of oil from home sources. This relationship was extended later to the Petroleum Department, when this authority was entrusted with all questions of fuel oil for national purposes. The Board have now undertaken to make investigations for the South African Government into the suitability of certain of their coals for carbonization and gasification. They are co-operating with the Manchester Corporation in a research into the efficiency of ordinary domestic grates; and, at the request of the Ministry of Health, they are directing the experiments being made by Mr. A. H. Barker into the efficiency of cooking-ranges. In regard to the general question of air pollution by smoke and dust from domestic fires and from factories and power stations, the Board have co-operated with the Advisory Committee on Atmospheric Pollution of the Meteorological Office for the past three years, and more recently with the Smoke Prevention Committee of the Ministry of Health, in their consideration of the possibilities of legislative action on this matter.

Conservation of Coal and Mineral Resources—Another Basic Problem.

The Coal Conservation Committee of the Ministry of Reconstruction, in their final report, recommended that the Geological Survey "should be transferred from the Board of Education to the Committee of the Privy Council for Scientific and Industrial Research. The results of its work would then form part of the growing body of knowledge and information which it is the special function of that Department to create, co-ordinate, and place at the disposal of all other departments." After consideration of other matters bearing on the proposal, the Government determined to adopt this recommendation; and the transfer of the Geological Survey and Museum to the Research Department took place last November. A Geological Survey Board was appointed to direct operations; and plans are now under active consideration for extending the work of the Survey to enable it to meet the increased demands upon its services which the organization of research for industrial and national purposes will certainly make.

We think the Department are fortunate in having secured the continuance of Sir Francis Ogilvie's services in connection with the Survey, while his wide knowledge and long experience in related fields will enable him, as the Principal Assistant Secretary of the Department, to ensure due correlation of research in geology with the many other groups of investigation already within, or likely to come within, our purview.

Referring to aid given to scientific and professional societies, the Council remark that the work of Dr. J. W. Mellor on gas-retorts for the Institution of Gas Engineers will undoubtedly save the gas industry many thousands of pounds annually; while Dr. Margaret Fishenden's experiments for the Air Pollution Advisory Board of the Manchester Corporation have determined once for all the efficiency of the open grate, have shown it to be far more effective than was thought to be the case, and have proved conclusively that the true line of advance is to be found in a proper control of the draught. During the five years, grants have been recommended to 32 societies and organizations in respect of 69 researches, at a total cost (including those recommended this year) of £68,816. One of three special grants for urgent industrial research at educational institutions is in connection with glass technology at Sheffield University.

The Council say that the nation has provided considerable sums of money for the work entrusted to them; and they have endeavoured to plan the expenditure of the money in such a way as to ensure that full value should be obtained by the nation. From the industries the State has not claimed, and does not claim, any share in financial results obtained with the aid of its grants. The returns from the expenditure will be more valuable; for they will be found, the Council hope, in the increased prosperity of the country, and the security this prosperity will bring.

The report itself gives a detailed account of the activities of the Department during the past year, and is divided into three parts. Part I. describes the progress made in the establishment of research associations, and discusses certain problems which their activities are bringing into prominence. Part II. deals with the organization of research for national purposes. Part III. sets out the more important developments that have taken place since the last report in the conduct of researches initiated by other bodies and aided by grants from the Department. It also deals with grants to individual research workers and students, and reports the action taken as regards the administration of patents.

As to work at the National Physical Laboratory, experiments have been made for the Office of Works on the lighting of picture galleries; and an investigation is in progress relative to the lighting of public buildings and offices.

Dealing with the work of the Fuel Research Board, the Council give an abstract of the interim memorandum on Fuel for Motor Transport—see "JOURNAL" for July 21 last, p. 131.

GAS-CYLINDERS RESEARCH COMMITTEE.

On the subject of gas-cylinders, the Council make the following remarks:

The Gas-Cylinders Research Committee have been continuing research with a view to evolving a suitable specification on the basis of the reports made by the National Physical Laboratory upon the light high-tension steel cylinders used during the war. Two large firms of cylinder makers completed orders for cylinders according to the Committee's specifications; and the cylinders have been thoroughly tested and reported on by the National Physical Laboratory. The Committee have yet to conclude their deliberations upon the report.

It has been agreed to prepare a sound interim specification for a commercial cylinder at an early date; and, when this has been done, to turn to the longer task of calling and examining witnesses representing steel makers, cylinder makers, gas-compressor makers, large users of gas, railway transport, and scientific experts before issuing final recommendations in a more detailed report on the whole subject.

The Committee have received a request from the Oxygen Research Committee to have a certain size and weight of cylinder manufactured and tested that could be satisfactorily handled in sick wards or hospitals. This will be taken up shortly; and more than one size of small cylinder for oxygen treatment will undergo careful tests in this manner. Prof. Coker, of University College, London, is conducting a research on stresses in cylinders; and Professor Lea, of Birmingham University, is making investigations into cylinders constructed from light aluminium alloys. The Committee propose to investigate the possibility of a commercial production of the cylinders they specify by

placing small orders with firms, and watching the manufacture at the maker's works.

BUILDING MATERIALS RESEARCH COMMITTEE.

In connection with the work of the Building Materials Research Committee, it is pointed out that during the year all the tests which were begun have been completed, with the exception of those relating to stoves and cooking appliances. This investigation will be continued under the direction of the Fuel Research Board.

The investigation into the heat-insulating properties of various wall materials carried out by Mr. A. H. Barker has yielded some interesting results. Tests on the porosity of building materials conducted at the National Physical Laboratory show that the leakage of air due to this cause is negligible in comparison with the percolation of air brought about by small cracks and fissures in door and window fittings.

The research on stoves, ranges, and cooking appliances has been continued by Mr. Barker at University College, London. In these tests, accurate determinations have been made of the efficiency of the various elements of the cooking-stove. It has been shown that maximum efficiency is to some extent incompatible with convenience and ease of use in the various parts of a stove. On the results obtained, Mr. Barker has been able to produce a type of stove which has aimed at providing the greatest degree of convenience in use in addition to much greater efficiency than the types on the market at the present time. This stove, which can burn low-grade and cheap fuels, consumes only some 30 to 50 p.ct. of the amount of fuel necessary in some of the commercial ranges.

The results of the tests of different specimens of slag, coke breeze, and clinker, collected from various parts of the conntry, suggest that a far greater number of materials than current practice allows can safely be used as aggregates for concrete, provided reasonable care is taken in mixing the concrete, and that a high-class cement is used.

The Lubricants and Lubrication Inquiry Committee have now presented their final report. The Council, however, realize the great importance of continuing research into the theory and practice of lubrication; and they have accordingly appointed a small Committee to prepare and direct a carefully thought-out scheme of investigation into this difficult and interesting subject.

CASTING GAS-RETORTS.

Under the heading of aided researches, the Council say:

In our last annual report, some account was given of the researches upon refractory materials carried out on behalf of the Refractory Materials Joint Research Committee of the Institution of Gas Engineers and the Society of British Gas Industries, with the aid of a grant from the Department under the supervision of Dr. J. W. Mellor. Mention has been made of the discovery of a process by means of which gas-retorts of most satisfactory texture and surface have been cast and burnt. We now understand that these retorts have received the commendation of both manufacturers and gas engineers, and are at the present time being made at various works for trial on a practical scale. Other useful work has been done on comparative tests of machine-made and hand-made silica bricks, and upon the specific heats of refractory materials at high temperatures. The following further investigations are now in progress: Action of reducing flames on refractories; gas permeability and porosity; heat conductivity and porosity; binding cements for refractories; binding agents for silica bricks.

In recommending a grant for the continuance of the research during the present calendar year, we have expressed the hope that, at the end of the time, the Refractories Research Association will accept responsibility for the investigations.

AIR POLLUTION.

In our last annual report it was noted that the grant in aid of the work undertaken by the Advisory Committee on Atmospheric Pollution would be continued until the transfer of the Meteorological Office to the Air Ministry. This transfer was effected in November last. Since the beginning of the investigation, useful data from a number of stations situated in various parts of the Kingdom have been steadily accumulated. In such a complex subject as that of atmospheric pollution, its nature, causes and prevention, and the effects upon public health and buildings, it is only to be expected that generalizations will but slowly emerge. Much more work is necessary before conclusions can safely be drawn. The work so far undertaken is, however, of considerable value in forming the foundation stones of a structure of facts. The Committee have worked-out and standardized methods of collection and analysis; and special apparatus has been devised for the accurate collection and measurement of the total impurity in the air, for the filtering and measuring of suspended impurity, for estimating the acidity of the air, &c.

There are a number of appendices to the report.

The Bournemouth "Co-Partner."—It is a pleasure to be able to welcome a new works' magazine in connection with the gas industry. This time it is the "Co-Partner" of the Bournemouth Gas and Water Company, which makes its appearance with an introductory note by Mr. William Cash (the Chairman of the Company), an article by Mr. Philip G. G. Moon (the Engineer and General Manager), and a message from Lieut.-Col. H. W. Woodall (late Engineer and General Manager). There is undoubtedly a very useful purpose to be served by periodicals of this character, in stimulating interest and drawing closer together those who are connected with an undertaking in different capacities. Judging by the contents of the first issue, the Bournemouth "Co-Partner" will serve this purpose to the full, as do the co-partnership magazines of other gas undertakings that have preceded it. It is particularly gratifying to note, too, that with the exception of one or two of the items everything in it has been produced on the works.

DETERMINATION OF SULPHUR FORMS IN COAL.

By ALFRED R. POWELL, of the Pittsburgh Experimental Station of the United States Bureau of Mines.

[From the "Journal of Industrial and Engineering Chemistry."]

An accurate method for determining each form of sulphur in coal would be useful, as indicating how much of the sulphur-containing material could be removed from the coal by washing processes, what effect the sulphur had on the heating value of the coal, how the various sulphur forms behaved during the coking and the gas-making processes, and other facts of interest to coal technologists.

HISTORICAL.

Iron pyrites has been known for a great many years as one of the constituents of coal; and there has also been fairly good evidence of the presence of sulphur in organic combination. The first method proposed for the determination of these two forms was by means of sodium hypobromite. The supposition was that the hypobromite dissolved the pyrites and sulphates without affecting the organic sulphur; but it was later shown that some of the organic sulphur was brought into the solution by this method.

In a method used in recent years, the total iron in the coal, *minus* any water-soluble iron that may be present, is considered to be combined as pyrites. From this value is calculated the sulphur existing as pyrites. Any sulphur present as sulphate may be determined by a simple extraction with dilute acid. The pyritic sulphur, *plus* the sulphate sulphur, when subtracted from the total sulphur, gives that organically combined, provided no other form exists in the coal. This method must be regarded as a rough approximation only, since it disregards the presence of any iron silicate.

A method based on a gravity separation was devised in 1914 by Messrs. A. C. Fieldner and F. D. Osgood, of the Bureau of Mines. The coal was separated into float and sink fractions by the use of zinc chloride solution of 1·35 sp. gr. The sulphur in the heavy portion was considered as pyrites, and that in the light fraction organic sulphur, after calculating the small amount of iron in this latter fraction to pyrites. This method was somewhat approximate; but its application indicated that organic sulphur was present in most coals to a much larger extent than had been generally supposed.

Coal pyrites has been determined very recently by a roasting method, in which the soluble iron compounds were washed-out of the coal and the residue strongly ignited, to convert the pyrites to iron oxide. This oxide was extracted and determined, and the pyrites calculated. It would seem, however, that there might be a possibility of the iron oxide reacting with other ash constituents during the ignition to form silicates.

An accurate analytical method has, within recent years, been developed for the systematic analysis of sulphur forms in coal. On testing-out this method, it has given good results with the coals analyzed, most of which were Illinois coals. The purpose of the present investigation is to extend the method to a variety of coals from entirely different fields, to make a thorough study of the sulphur forms present, and devise any modification of the method necessary in certain cases.

EXPERIMENTAL METHODS.

The methods of analysis were practically the same as those used by Powell and Parr,* but modified at certain points. For portions of the analysis, recommendations have been made which it is thought will render the method more applicable to routine analytical procedure.

Total Sulphur.—Total sulphur determinations were made on each coal by the sodium peroxide method used by Powell and Parr. The results were very irregular; and blank determinations on the sodium peroxide showed large quantities of sulphur which were not constant for different portions of the same batch. Furthermore, the nickel crucibles were attacked by the hot alkaline fusion to such an extent that some nickel was occluded by the barium sulphate in the final precipitation.

These difficulties led to the adoption of the Eschka method for sulphur in coal. This was used not only in the determination of total sulphur, but also for the sulphur in coal residues throughout the investigation. The percentage of total sulphur in the coal, as well as that of the different sulphur forms, is calculated on the basis of the air-dry coal.

Sulphur as Sulphate.—The analysis for sulphate was performed in exactly the manner used by Powell and Parr. Five-gram samples of the coal were extracted with 300 c.cs. of 3 p.ct. hydrochloric acid for forty hours. The beakers in which the extraction took place were kept over a water bath, at a temperature of about 60° C. The contents were filtered, and the filtrate was analyzed for iron by the Zimmerman-Reinhardt potassium permanganate titration method, and for sulphur by the usual barium sulphate precipitation.

Later experiments have indicated that the extraction time may be shortened considerably without appreciably affecting the determination. If the finely powdered coal is boiled with concentrated hydrochloric acid diluted to twice its volume, complete extraction

* See "JOURNAL," Vol. CXLIX., p. 79.

of the sulphates is secured in 15 or 20 minutes. Though pyrites is slowly decomposed under these conditions, the extraction time is so short that the quantitative results are not affected.

Sulphur as Pyrites.—For the pyrites analysis, 1-gram samples of the coal were allowed to stand with 80 c.c. portions of dilute nitric acid (sp. gr. 1·12) for two or three days at room-temperature. Twenty-four hours is probably sufficient for this extraction, though a longer time does no harm. If a shaking machine is available, the extraction time can be cut down to one or two hours.

The extract was filtered off, and the nitric acid was evaporated on the water bath. The residue from this evaporation was taken-up in hydrochloric acid, and analyzed for iron and sulphur by the methods just mentioned.

The iron obtained in the nitric acid extract represented the iron which was extracted by the hydrochloric acid, *plus* the iron combined as pyrites. Therefore the pyritic iron could be figured by the difference between the two iron determinations. The sulphur in the nitric acid extract represented the sulphate sulphur, which had been determined previously by hydrochloric acid treatment, *plus* the sulphur combined as pyrites. Also, if the dilute nitric acid were dissolving any of the organic sulphur, this would appear in the extract. The question as to whether any of the organic sulphur was being dissolved could be answered by comparing the percentage of pyritic iron with what was presumably the percentage of pyritic sulphur, as obtained by subtracting the percentage of sulphur found in the hydrochloric acid extract from that found in the nitric acid extract. If the pyritic iron and the sulphur were in the exact proportions to form FeS_2, the nitric acid was a selective solvent for pyrites in this particular coal. If the sulphur were in excess, however, the indications would be that the organic sulphur of the coal was being attacked by the dilute nitric acid. By means of these calculations, the accuracy of the method for pyritic sulphur was checked.

Sulphur in Organic Combination.—In ordinary commercial practice, the organic sulphur would be determined by subtracting the sum of the two inorganic forms from the total sulphur. In the present investigation, it was necessary to prove that this remainder was organic. The amount of sulphur in organic combination was determined by much the same means as those used by Powell and Parr. The phenol-soluble type of organic sulphur was calculated from the difference between the total sulphur content of the coal and the sulphur content of the coal residue after phenol extraction.

The extraction of the coal by phenol was carried out in an oven at a constant temperature of 150° C. Air condensers were so arranged that the vaporized phenol would be carried-back into the extraction flasks. Half gram samples of coal and 25 c.cs. of phenol were placed in the flasks, and the extraction allowed to proceed for twenty hours. The contents were filtered through a porcelain Gooch crucible, and thoroughly rinsed with alcohol and ether. The entire asbestos mat, with its covering of coal residue, was ground-up with the Eschka mixture, and the sulphur determination run in the usual manner. As stated before, the phenol-soluble organic sulphur was obtained by difference. The phenol-soluble material is known to be organic because of its lack of ash.

The so-called "humus" type of organic sulphur—that very stable portion which is not extracted by phenol—was determined directly by a method differing slightly from that used by Powell and Parr. The residues from the dilute nitric acid extraction, previously described, were used for these experiments, since all the inorganic sulphur had been removed and all the organic sulphur was present. In most cases (particularly where little is present) the phenol-soluble sulphur will respond to the treatment which is given the more stable humus organic sulphur. The following method was accordingly used for the total organic-sulphur determination. In the case of only one coal, where the phenol-soluble sulphur was high, it was necessary to extract first with phenol, then with dilute nitric acid, to remove the inorganic sulphur, and to finish the analysis for the humus organic sulphur by itself.

It was found that the residue from dilute nitric acid extraction did not readily dissolve in ammonia, so this residue was further treated with concentrated nitric acid. The nitric acid was then evaporated-off on the water-bath, leaving a residue readily soluble in ammonia. In the case of one coal—a semi-bituminous coal from the Pocahontas field—three treatments with nitric acid, followed each time by evaporation on the water bath, were necessary to digest sufficiently the coal for the alkaline solution.

The residues were treated with 25 c.cs. of concentrated ammonia, and allowed to stand for some time. They were then filtered through an ordinary filter-paper; the filtrations requiring about one week, on account of the colloidal nature of the solutions. Previous research showed that this alkali-soluble material was almost ash-free, and therefore organic in nature. Most of the ash of the coal was left on the filter.

The dark-brown, colloidal solution was evaporated to dryness on the water bath, and the sulphur in the residue was determined by the Eschka method. This, then, gave the total organic sulphur content of the coal by a direct procedure, unless the coal had previously been extracted with phenol, in which case the process gave the humus type of organic sulphur by itself.

This procedure indicated whether the methods of analysis for the various forms of sulphur in the coal were accurate; and the only question left was as to the possible existence of some other form of sulphur in the particular coal studied. This was easily determined by comparing the sum of the percentages of the forms of sulphur for which analyses had been run with the total sulphur percentage of the coal.

[Tables give a detailed description of the source of each coal used, its proximate analysis, and its calorific value, as well as the results of analyses for the different forms of sulphur and a comparison of their total with the total sulphur of the coal. It is remarked that the sum of the different analyses checks very closely with the total sulphur in the case of each coal. There can be no doubt, therefore, that all the sulphur of these coals has been accounted for in the four forms of pyrites, sulphate, and the two forms of organic sulphur.]

CONCLUSIONS.

1.—The method of Powell and Parr for sulphur forms in coal gives correct and accurate results, as proved by experiments on a variety of coals from different regions.

2.—The method may be used as originally outlined; but for rapid routine work, the following changes are suggested:

(*a*) After the sulphate and pyrites determinations are complete, the organic sulphur may be reckoned from the total sulphur by difference.

(*b*) The extraction of sulphates may be completed in a few minutes by boiling with hydrochloric acid (sp. gr. 1·12), rather than by slow extraction with the very dilute acid. The boiling acid does not decompose pyrites to any appreciable extent.

(*c*) The extraction of pyrites by dilute nitric acid may be completed in an hour or two by the use of a shaking-machine.

(*d*) Dilute nitric acid will extract small amounts of the unstable phenol-soluble form of organic sulphur from certain coals. To avoid this error in laboratory determinations, it is recommended that pyritic sulphur be calculated from the pyritic iron value.

(*e*) Dilute nitric acid not only extracts pyrites quantitatively, but also the same iron and sulphur which is taken into solution by dilute hydrochloric acid. For this reason, samples intended for dilute nitric acid extraction need not be extracted with hydrochloric acid first.

3.—Semi-bituminous coals and the harder varieties of bituminous coals must be digested for a long time with concentrated nitric acid before the organic matter will become completely soluble in ammonia.

4.—The Eschka method is preferable to the sodium peroxide method for the determination of sulphur in coal and coal residues, unless the sodium peroxide used has a low and constant sulphur content.

GROWTH OF BUSINESS AT OTTAWA.

Steaming Vertical Retorts.

In common with other Canadian undertakings, the Ottawa Gas Company have had their share of anxieties, due to rising costs; and Mr. A. A. Dion declares that continued existence under these burdens is owing in very large measure to the installation a few years ago of a new works with modern carbonizing and complete coal and coke handling plants. This provision of Glover-West vertical retorts and other apparatus has enabled them, with greatly reduced labour, to carbonize without difficulty all coals, including the lower-grade sorts that it has been necessary to use lately, and to obtain a yield of 16,000 c.ft. per short ton, with a satisfactory yield of bye-products—the coke being of very good quality, and in such great favour that the demand always exceeds the production.

Ottawa is largely a residential city; and the rapidity with which the population grows is shown by the fact that in 1900 the number of the people was 58,193, while in 1919 it was 107,730. Rapid as this increase has been, however, it is exceeded by the growth in gas consumption. In 1914, the output of gas was 259,100,000 c.ft.; and by 1919 it had reached 421,814,000 c.ft.—an increase of 75 p.ct., while in the same period the population increased about 33 p.ct. With a make of 12,000 c.ft. per ton of coal (which was the average during 1918), 37,651 tons of coal would have been required to produce the 1919 output; whereas the actual amount needed with the production of 16,000 c.ft. was 28,238 tons—a saving of 9413 tons. The 4000 c.ft. per ton increase was obtained by passing additional steam into the retorts—producing water gas there. The steam was generated mostly by coke breeze, and therefore at little cost. By this procedure, the production of coke was naturally affected—being reduced from 63 p.ct. of the coal carbonized in 1918 to 58 p.ct. in 1919. On the other hand, the tar yield increased from 10·76 to 13·01 gallons, and the ammonia yield from 3·58 to 5·03 lbs.

The Glover-West carbonizing plant was designed for an ultimate capacity of 6 million c.ft. per day, in four self-contained units of 1½ million c.ft. Only one of the units has so far been built; but provision has been made for adding the other units from time to time, with a minimum amount of disturbance to the plant already in operation. In some respects, where considerable ultimate saving was possible, the construction was made to cover two units. In every way the vertical retort plant has realized expectations.

COKE-OVEN MANAGERS' ASSOCIATION.

(MIDLAND SECTION.)

On Saturday last, members of the Midland Section of the Coke-Oven Managers' Association spent a very enjoyable and profitable afternoon visiting the coke-oven works of the Redbourn Hill Iron and Coal Company, Ltd., at Scunthorpe. The party, numbering about 35 members and associates, were met by Mr. J. T. Price, M.B.E. (the Manager), who was assisted by Mr. W. C. Phillips (the Assistant Manager) and Mr. H. H. Phillips (the Chemist) in showing the visitors over the installation, which was designed by the Coppée Company (Great Britain), Ltd.

Afterwards, the party were hospitably entertained at tea, at the close of which a meeting of the members was held, when Mr. J. W. Lee (the President) took the chair, in the absence of Mr. J. A. Davy (the Chairman of the Section), who had to leave earlier. Mr. Lee made many complimentary remarks upon the lay-out of the works, and the attention that had been paid to detail. He also spoke of the great amount of work that Mr. Price had done for the Association, and hoped that, though so far away, he would remain an active member.

Mr. J. H. Thorpe proposed a hearty vote of thanks to the Directors of the Company, and to Mr. Price and his assistants, which was seconded by Mr. M. E. Nicklin.

Mr. Price, responding to the vote, after speaking of his pleasure in receiving the members of the Association, expressed the regret of the Directors of the Company and of the Coppée Company at not being present.

INCREASED EFFICIENCY OF DOMESTIC COOKING APPLIANCES.

LOW-GRADE GAS, AND FLAME CONTACT.

By J. H. DAWE, of Oldham.

[A Paper to be read before the Manchester District Junior Gas Association on Saturday, Oct. 2.]

In this short paper, I want to show the increased efficiency with low-grade gas and flame contact; how this has been done; also where low-grade gas can play its part with suitable appliances. It is not my intention, however, to go into the question of inerts, &c.

For several years, many of us have been interested in low-grade gas, and have been sceptical as to its adoption; but war conditions, shortage of coal, &c., have compelled us to supply it. Others may have adopted it from a commercial standpoint. Later in the paper, I will give some results obtained from tests carried out on boiling burners and hot-plates with varying grades of gas.

The American Government are trying to reduce the wasteful use of natural gas, and have commenced a campaign in respect to this. One recommendation for the conservation of the gas is to raise the burners to suit shorter flames, or else lower the vessel, but never to allow the flame to lick up the side of the vessel, as this is waste.

You may say this has nothing to do with high or low grade gas. Perhaps not altogether; but I think it shows that flame-contact is very essential. This also applies to coal gas (or any other gas) burned in existing appliances. In respect to a gas of (say) 600 B.Th.U., on lowering the vessel the flame licks up the sides more than before the vessel was lowered. This is proof of wasted B.Th.U. Often the light goes out. Why? Just because there is not sufficient primary air mixed in the burner tube under ordinary town pressure, and the flame is not able to obtain the necessary amount of air—viz., about five volumes of air to one volume of gas at the burner head—for complete combustion.

With a lower quality of gas (say, 400 or 450 B.Th.U.) the required amount of air—viz., about 3½ volumes to 1 volume—can be drawn into the mixing-tube by its own gas pressure. Hence more perfect combustion. Under ordinary town pressure of gas, sufficient air cannot be drawn-in to consume thoroughly a 600-B.Th.U. gas. A 400-B.Th.U. gas requires volume, not pressure; a 600-B.Th.U. gas requires pressure to draw-in sufficient air.

The following tables go to show first that, by having closer flame contact, better results can be obtained—viz., less B.Th.U. are required; and secondly, that by a lower-grade gas, a still better result is obtained, and less B.Th.U. again are required. A kettle of water was heated on a hot-plate, first on the bars originally supplied by the makers, then by new bars placed nearer the burner.

High-Grade Gas.

	Original Bars.	New Bars.
Quality of gas	593 B.Th.U.	593 B.Th.U.
Pressure of gas	30-10ths	30-10ths
Water heated	1 quart	1 quart
Range of temperature	80° Fahr.	80° Fahr.
Gas required	2·92 c.ft.	2·10 c.ft.
B.Th.U. required	17.6	1245

This then is an example of flame contact.

Low-Grade Gas.

	Original Bars.	New Bars.
Quality of gas	441 B.Th.U.	441 B.Th.U.
Pressure of gas	30-10ths	30-10ths
Water heated	1 quart	1 quart
Range of temperature	80° Fahr.	80° Fahr.
Gas required	3·32 c.ft.	2·37 c.ft.
B.Th.U. required	1587	1100

Another test carried out was on a ring-burner, having an adjustable gas and air regulator.

Quality of gas	463 B.Th.U. gross (415 B.Th.U. net)
Pressure of gas	30-10ths
Water heated	1 quart
Range of temperature	153° Fahr.
Gas required	1·732 c.ft.
B.Th.U. required	708

The distance from the burner to the kettle was 9-16ths of an inch. Surely this says something for low-grade gas, as well as for the efficiency of the burner.

My last example is one of a series of tests carried out on a "Pleno" boiling burner. The quality of the gas was 414 B.Th.U. (gross) or 384 B.Th.U. (net) of the following composition:

Carbon dioxide	5·1 p.ct.
Unsaturated hydrocarbons	1·7 ,,
Oxygen	1·2 ,,
Carbon monoxide	17·1 ,,
Methane	17·4 ,,
Hydrogen	49·8 ,,
Nitrogen	7·7 ,,
Quality of gas	414 B.Th.U. gross (384 B.Th.U. net)
Pressure of gas	29·5-10ths
Water heated	1 quart
Range of temperature	150° Fahr.
Gas required	1·518 c.ft.
B.Th.U. required	582·9
Efficiency	64·3 p.ct.

Of lighting I am not going to say much; but it is, I am sure, worth notice, as far as incandescent lighting is concerned, not flat-flames. Tests carried out on different grades of gas were as follows:

Gross calorific value of gas B.Th.U.	691	600	497	447
Pressure of gas	31-10ths	31-10ths	31-10ths	31-10ths
Cubic feet per hour	4·483	4·960	5·715	6·10
B.Th.U. per hour	3098	2976	2839	2727

If low-grade gas be adopted, I feel sure all will benefit. Less coal is used, which has already been proved, to a very large percentage, which is so important a factor to-day. Higher makes are obtained; and here, perhaps, the question may be raised, What about coke? Seeing that coke gives about 20 to 30 p.ct. efficiency, and gas will give 60 p.ct., I think the answer is very obvious. To the consumer, cheaper and cleaner gas, no sooty pans or mantles, and also one of the best knocks we can give to our competitor, electricity.

The 450 B.Th.U. Standard in Canada.

In his address to the Canadian Gas Association—whose meeting was held in Ottawa on Aug. 27 and 28—Mr. V. S. M'Intyre, the retiring President, said he felt the lowering by the Government of the calorific standard for gas was one of the most important and progressive moves that the Association had helped to accomplish. The adoption of a 450 B.Th.U. standard has had a far-reaching effect, and will react towards the international conservation of coal and fuel oils. The question of a more economic standard for gas is also one of the most essential issues engaging the attention of the American Gas Association, who are at present advocating a lower and common standard for every State in the Union. The conservation of supplies becomes, as time passes, more and more necessary. In fact, the shortage of coal and fuel oils, their high cost, and the inability to obtain satisfactory contracts and deliveries, are the most serious problems to be contended against to-day. Methods of conservation must be adopted by the American and Canadian Governments, in order to ensure continuity of supply of coal and fuel oil to the gas industry, which can use these materials more efficiently than any other industry, and through the distribution of gas and the sale of bye-products give service to the greatest number. As means of conservation, he suggested the advisability of increasing, if possible, the efficiency of gas-ovens, and educating consumers to the more careful use of hot-plates. With all its difficulties, while the cost of materials required in the production of gas has increased in many cases as much as 400 p.ct., the increase in the price of gas has averaged no more than 80 p.ct.

The Hon. Secretary of the Midland Association of Gas Engineers and Managers (Mr. W. G. S. Cranmer, of Willenhall) intimates that the autumn general meeting will be held in Birmingham, on Thursday, Oct. 28.

On Friday morning of this week, there is to be a meeting at the Beckton Gas-Works of the Institution of Municipal and County Engineers, at which Mr. F. W. Goodenough will read a paper on "Gas in Relation to the Housing Problem." Luncheon by invitation of the Governor and Directors of the Gas Light and Coke Company will be followed by an inspection of the works.

UTILIZING COKING SLACK.

A paper submitted by Messrs. A. E. Beet and A. E. Findley, at the annual meeting of the Institution of Mining Engineers, on the "Better Utilization of Coking Slack," emphasized the fact that there are certain coals which, on washing, cannot be rendered low enough in sulphur and ash to give a coke suitable for metallurgical purposes.

The object of the authors was to suggest means of preventing these types of coal from going to the coking plant, and of utilizing them to the best advantage. They had conducted experiments in the separation of coals, in various liquids of different specific gravities—the idea being to use only the best of the coal for coke making, and to submit the inferior fuel to low-temperature distillation for the formation of fuel oils and a smokeless fuel of the nature of "Coalite." The conclusion was that it was possible to separate any coking slack into two or more fractions, one of which would be an almost ash and sulphur free coal for the production of superior coke; the second, a coaly substance admirably suited for low-temperature distillation in a suitable vertical retort; and the third, which might be taken to ash in the retort, yielding a low-grade gas as the main product, with oils similar to mineral oils and sulphate of ammonia as bye-products.

Dealing in detail with the second fraction (for low-temperature distillation), they said it would yield Coalite considerably less friable than anything obtainable from non-coking coal, and having little tendency to stick in the retort. The weight of this fraction varied from 17 to 34 p.ct. of the weight of coking slack; and it would yield a Coalite containing from 7 to 12 p.ct. of ash and enough volatile matter (6 to 10 p.ct.) to render it easily ignitable, as well as 20 to 25 gallons per ton of oils resembling mineral oils, from 11 to 15 lbs. of sulphate of ammonia, and 7000 c.ft. of rich gas per ton, from which, by steaming, one could reasonably expect a yield of from 30 to 50 lbs. of sulphate of ammonia and from 12,000 to 15,000 c.ft. of a poorer gas of about 500 B.Th.U. In using this method of separation, the results expected from each fraction were as follows: The yields of all products would be slightly increased on present coking practice, better gas would be made, a metallurgical coke with a much lower percentage of ash and sulphur and a consequently higher calorific power would result, and the scrubbing for the light oils would be rendered more efficient, because there would be a lower percentage of diluents in the gas.

The Coalite would be the main product. Labour costs and troubles in the working of the plant would be enormously reduced. The yields of ammonia, oils, and gas would not be (if at all) very appreciably affected. Furthermore, the main product would be a saleable one—probably at a price very little below that of the coal from which it was prepared. There would be only ashes to be disposed of, thus preventing the spontaneous combustion of inflammable pit-heaps. The yield of oils would be very appreciably increased, while that of sulphate of ammonia would be nearly doubled. A market would, of course, have to be found for the low-grade power-gas produced. The establishment of a central electric power-station would find an outlet for this gas, and enable the undertaking to make an ample profit, while selling at a very low figure.

TAR AND AMMONIA FROM KELP.

The United States Department of Agriculture have for some time past had in operation at Summerland, California, an experimental kelp-potash plant, designed for the determination of the best methods of dealing with kelp, for the extraction of potash salts and the simultaneous recovery of other valuable products. The process whereby the kelp is treated prescribes its reduction to a charcoal, from which potassium chloride and iodide are easily recovered. This reduction is essentially a destructive distillation, and is best carried out in closed retorts. Under such conditions large quantities of distillation products are obtained; and it was the purpose of a research described by Mr. G. C. Spencer in the "Journal of Industrial and Engineering Chemistry," to determine the nature of these products, from the point of view of their possible commercial value.

As in the case of coal distillation, the nature of kelp tar varies greatly with the temperature at which the process is conducted. Since dried kelp contains about the same percentage of nitrogen as bituminous coal (2 p.ct.), it was hoped that the presence of this nitrogen would promote the formation of aromatic compounds in the distillate at higher temperatures corresponding to those used in destructive coal distillation. But results did not warrant this view. Kelp tar, as a matter of fact, stands in a class by itself as regards its properties and constituents. Three series of investigations were carried out to determine the nature of the condensates from high, intermediate, and low temperature distillations of kelp. It was found that low-temperature kelp tar has fewer desirable properties, from the industrial point of view, than that made at higher temperatures; and so far as is known at present, its chemical constituents would be of little more than academic interest.

A sample of the disinfectant produced from kelp tar resulting from intermediate temperature distillation was examined by the Pathology Section of the Forest Products Laboratory for its toxic power against certain wood destroying fungus. The report stated that: "Kelp tar disinfectant is one-and-one-fourth times as toxic as pure coal-tar creosote, and twice as toxic as the zinc chloride and gum arabic emulsions of coal tar creosote." The residual kelp oil has value as a flotation oil for ore concentration. These products would find a ready market. The pitch residue from kelp tar distillation is a source of nitrogen for prussian blue and cyanogen compounds. The aqueous kelp liquor contains ammonia in workable quantities; and the water-soluble distillate from the residue on evaporation might be used as a glycerol substitute for mechanical purposes.

To sum up, the author says his account of the research shows that kelp tar can be separated into groups of compounds which may be designated tar acids, neutral oils, ammonia, and pitch. Though the general characteristics of these groups have been determined, the chemical identity of the constituent compounds has not been established.

CLEANING BLAST-FURNACE GASES.

The subject of cleaning blast-furnace gas by means of the Lodge electrostatic process was dealt with in a paper read by Mr. Alfred Hutchinson (and prepared in conjunction with Mr. E. Bury) at the autumn meeting of the Iron and Steel Institute.

It was stated that the question had been under consideration for ten years. It was felt that if a process could be found whereby gas from blast-furnaces could be cleaned without loss of the sensible heat contained in blast-furnace gas, a valuable fuel asset would be secured. The advantages to be derived from using cleaned gas included greater thermal efficiency and a reduction in the labour employed for cleaning. The main difficulty lay in the fact that the existing rough cleaning processes did not economize in sensible heat in blast-furnace gas which it was desired to preserve; and the question was postponed until the latter period of the war, when the matter again presented itself very forcibly, owing to the shortage of potash in this country.

During 1916 it was proved that potash existed in considerable quantities in blast-furnace dust. The possibility of cleaning dusty gases by electrostatic discharges had been raised by Sir Oliver Lodge as far back as 1882. Dr. J. E. Stead had also discussed the question; but the matter was not gone into further until Sir A. B. Gridley, Director of Electrical Supplies at the Ministry of Munitions, called attention to the success of electrostatic precipitation in the United States. It was finally decided that Messrs. Bell Bros. and the Skinningrove Iron-Works Company should erect a plant employing the discharge system invented by Sir Oliver Lodge. The plant had been at work since April last; and cleaning had been effected by a comparatively small loss of the original sensible heat. Less gas was used at stoves and boilers; but it was too early to state the total saving accurately. The surplus gas available had been increased; and the recovery of 48 to 50 tons of dust per week was found to contain 27 p.ct. of potash.

Increasing the Calorific Power of Gas.

In the current number of the Rochester (N.Y.) "Gas and Electric News," Mr. W. H. Earle describes what was done to correct the lowered heating value of gas produced in a vertical retort plant. The installation was producing gas of 576 B.Th.U., while the State requirement was 585 B.Th.U. The nitrogen content averaged about 12 p.ct. Last winter, when the plant was running at reduced capacity, it was discovered that, as the carbonizing periods were lengthened, the calorific value dropped, and the nitrogen increased in spite of the usual precautions. It was soon discovered that towards the end of long carbonizing periods, so little gas was being produced that the normal suction carried on the upper foul main satisfied itself by pulling-in air around the top lids. To control this, the hydraulic main seal was increased from time to time on each bench. Then when the plant reached its full capacity again, the lesson was applied to the regular operation. The process is that after a bench is charged, the tar is drawn off from the tar displacement tank, which lowers the liquor level in the hydraulic main. The dip-pipe is unsealed; and for the first hour or so carbonization proceeds at its maximum, with the direct foul main suction on the retorts. But the gas is made at so great a rate that there is a pressure on the top of the retorts and a little gas leak around the lids. Hence no air is drawn in. Finally, the normal liquor level is reached as the hydraulic main fills-up, and the gas has to break through a slight seal, which still holds the retorts under a small pressure. As the distillation proceeds, the retort-house foreman watches the top lids of each bench. When he sees one that shows no sign of gas or vapour issuing around its edge, he raises the hydraulic seal just enough to produce a periodic puff of gas around the lid as the pressure builds-up, until the gas breaks the seal again. The calorific value and air content are reported to him; and he notes the results. The April average was 588 B.Th.U.

The annual dinner of the Institution of Civil Engineers will not be held on Oct. 6, as was proposed.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Thermal Efficiency—Helps v. Carr.

SIR,—It is difficult to gauge the mentality of Mr. Helps in the opening paragraph of his letter in your issue of the 22nd inst., when making the deliberate misstatement that Mr. Harry Jones has not, in his letter in your issue of the 1st inst., referred to the matter of the "challenge."

On the other points in Mr. Helps's letter I have to say that any evidence that I have given on the Brighton or other Bill, on the question of the relative efficiency of varying qualities of gas, I adhere to, and reassert (if it is necessary to reassert) that wherever gas of a low thermal efficiency has been substituted for gas of a higher thermal value, the change has been made at the expense of the consumer.

The points of difference in the matter of the "challenge" are fully set forth in the correspondence published in your issue of Feb. 11, 1919. From this correspondence, I quote the following extract from Mr. Helps's letter to me dated Dec. 17, 1918:

> "If you do not agree to accept the conditions above set out, I will call in a chemist of unquestioned repute in the gas industry, and get him to undertake a series of tests, which he shall publish. And you may then make your comments thereon, and lay claim to having won, or acknowledge having lost, the challenge—as the case may be. But that this matter shall be put thoroughly to independent proof, you need have no fear. The public will give both of us fair play."

Personally I am not concerned whether or not Mr. Helps arranges to have his promised vindication published now or "later on," as so far there is nothing that disproves in the slightest degree my own tests, the results of which were published with the above-mentioned points of difference.

There may, however, be others who feel—after all these long years of fruitless talk and writing—that independent testimony from a reliable and disinterested source, on the lines indicated, in support of Mr. Helps's claim, would be a welcome and refreshing change.

Widnes, Sept. 25, 1920. ISAAC CARR.

The Betrayal of the Gas Shareholder.

SIR,—I beg to thank you for the space accorded to my letter of protest, and for your own remarks thereon, which I think are not really at variance with my statements, except that you think the "trick" of asking for more than is expected could not be employed by the "eminent financiers," &c.

It may or may not be a trick; but however you designate it, it is a very effective method of obtaining the desired result. It has been used in all the recent strikes, and threats of strikes, with the result that labour has obtained all it really expected. I am interested to see how it fares in the present coal deadlock; the Government, having shorn-away the "concession point" (the 14s. 2d. reduction), are now up-against the real thing.

It is much to be deplored that modern methods cannot be used by gas managements to obtain justice for shareholders.

With regard to Dr. Carpenter's remarks in your issue of the 22nd inst., it is just that pre-war experience he mentions that has, since 1903, prevented me investing further in gas stocks, and which will prevent my doing so in future.

Railways are not a parallel instance; but in any case, two wrongs do not make a right.

I fully sympathize with him in his difficulties with Government committees and the like. But he could always have withdrawn his Bill (I think this was done by one or two other companies) if the terms offered were not just. It almost appears that Dr. Carpenter made it a matter of personal pride to get the Bill through; and to do so he had to jettison the old much-tried shareholder.

Dr. Carpenter makes it a "bull" point for co-partnership that he has "not had a strike for thirty years." Perhaps not. But labour does not strike when it obtains by other means all it really wants. Some day Dr. Carpenter will run up-against a situation where there is nothing left between him and a strike except co-partnership. The matter will then solve itself. But I would like to point out that the apparent loss in a strike is often the very best investment a trading concern can make.

Dr. Carpenter suggests that I wished to make money out of the war. If he means that I wished to profiteer, he is wrong; but there is a very wide gulf between profiteering and a 3 p.ct. "war" dividend, coupled with a return to pre-war dividends when money is on an entirely different basis. Many gas shareholders are entirely dependent on these dividends; living has risen 150 p.ct. during the last five years, and is not likely to decrease; and they are now condemned to a life of poverty on a pre-war income and a permanent loss of capital. I cannot place all the blame for this on the Government.

Mr. Read's letter makes me gasp. He is evidently an optimist of the first water. In reply, I would like to mention that, though I did not state that the present arrangement is not better than the old sliding-scale, I do not think it is. A return of 5 p.ct. now is not equal to 4 p.ct. before the war (even though a minimum); and a study of the Money Market would soon prove it to Mr. Read. Dr. Carpenter puts it very clearly for him when he states that we now have a post-war settlement on a pre-war basis. Mr. Read states I "ask why my dividend is fixed at 5 p.ct.;" and then proceeds to not answer me by explaining why 6 p.ct. is allowed on new capital. Does not his "explanation" show that even a House of Lords Committee knows that 5 p.ct. is not sufficient? Good industrial ordinaries without an 87½ p.ct. perpetual excess profits duty are now on a 10 p.ct. basis, and likely to remain so! What then is a 5 p.ct. ordinary gas stock worth with an 87½ p.ct. perpetual excess profits duty, or a similar 6 p.ct. stock? The real facts are that Dr. Carpenter has gone to Parliament, and has secured permission to raise capital at a rate at which it cannot be raised. You, Mr. Editor, realize this when you mention "preference and debentures," both of which are detrimental to the ordinary stock. A week ago a practically 9 p.ct. guaranteed debenture was put on the market, while 7 and 8 p.ct. debentures are common as flies!

Mr. Read's remark about money on a 4 p.ct. basis is priceless. He is evidently under the impression that everything will revert to pre-war levels. A dispassionate survey of conditions entirely contradicts this. As far as this generation is concerned, present conditions are permanent. Are coal, and oil, and renewals likely to be cheaper? Are wages or rates likely to be reduced? There is no possibility of it. What is called "bonus" on salary and wages is really standard rate. In many trades (including my own) "bonus" is dead and buried. The sooner the gas industry realizes this fact the better.

Mr. Read can hardly expect me to acquiesce in his suggestion that I should refrain from stating facts in case ignorant investors are frightened off. It savours too much of holding a mythical carrot—in the shape of a nebulous return to 4 p.ct. money—in front of the donkey to dazzle it, so that it does not see the 87½ p.ct. perpetual excess profits duty. No, no, Mr. Read, we want satisfied, and not deluded, shareholders!

It is "accomplished facts" that I am protesting against. How then can I "accept them"? Did Mr. Read know "last December" that 5 p.ct. was to be accepted for old capital?

Mr Read's theories, *re* co-partnership, are amusing. It is easy to "submit that an opponent is wrong;" but that does not prove it. The real facts are that co-partnership has been welded on to the gas industry, and cannot now be got rid of. It is an "old man of the sea," whom we must all agree is a wonderfully pleasant fellow.

I fear I have overrun the space you can spare me; but in extenuation I must plead my desire to benefit the gas industry, and to endeavour to clear away the many misconceptions surrounding it. I may be too late in the case of the South Metropolitan Company; but there are others.

Sept. 24, 1920. ONE OF THE BETRAYED.

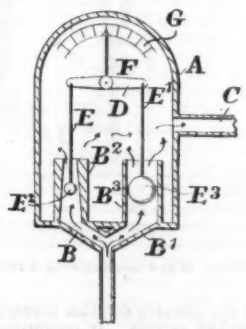
REGISTER OF PATENTS.

Flow Meters for Gases, &c.—No. 149,571.

HANSON, G. F., of Oxford.

No. 31,042; Dec. 11, 1919.

According to this invention, the fluids or liquids are divided into two unequal streams. Both streams are admitted to a chamber through two orifices, each provided with an extension the bore of which, in the case of the aperture for the smaller stream, is of gradually increasing cross-sectional area from the inner or upper end downwards. The bore of the other extension is parallel. From each end of a beam (after the manner of a pair of scales) two bodies of different diameters are suspended. The arrangement is such that when no fluid or liquid is passing through the device the heavier or larger body will tilt the beam, so that a pointer with which it is provided occupies the zero position. When, however, the incoming streams act upon the pendulous bodies, the beam will be turned more or less upon its pivot according to the volume of gas passing through the chamber—the actual volume being indicated by the pointer.



Hanson's Gas-Flow Meter.

The chamber A has inlet openings B, B¹, and an outlet C. Each inlet is provided with a tubular extension B^2, B^3, whereby the gas is admitted in two streams of different volume. The extension b^2 is coned internally from the lower end inwards; the bore of B^3 being parallel. The beam D is pivotally mounted within a chamber A; and from its respective ends are suspended by rods E, E^1, spheres E^2, E^3, the latter sphere being twice the diameter of E^2. Normally the superior bulk of sphere E^3 will cause the beam to assume its position of maximum inclination to one side of its pivot—its weight overcoming that of the sphere E^2. When, however, the two streams pass into the chamber and act upon the spheres (the action being greatest in the case of sphere E^3) the beam is caused to rotate, and the pointer assume a position corresponding to the total volume of the two incoming streams of gas.

Bunsen Gas-Burners.—No. 149,555.

SCHEFFER, W., and OPPERSDORFF, H. G. R., Berlin-Wilmersdorf.

No. 26,201; Oct. 25, 1919.

The patentees say: The known drawback met with in bunsen and similar gas burners—namely, the firing-back of the flame—has not yet been completely overcome even in the most improved forms. Among the means for counteracting the firing-back, the most effective

are the giving of a certain velocity to the gas and the cooling of the gas at the nozzle by wire-netting or the like. Another drawback consists in the imperfect mixing of the gas with the air.

In scrubbers and similar chemical apparatus for washing gases, producing reactions, and the like, use has for some time been made of short slit pieces of tube forming a "labyrinth path" for the gas. The resistance to motion produced by the bodies is very small; and they offer a very large surface, which is advantageous as regards cooling, and further assist in mixing the gas passing across them.

Bunsen burners are also known in which the mixing-tube is provided with a chamber containing small shot or pieces of other suitable material—such as metal, gravel, or the like—or again with a series of small tubes.

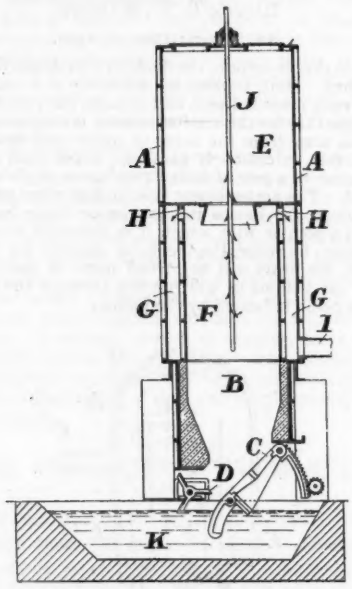
Now, in contradistinction to any of these materials, the patentees propose to employ the short slit pieces of tube as filling material for the chamber in the head of the burner, "whereby such a large cooling surface is provided that firing-back is entirely obviated."

Carbonizing Wood.—No. 149,773.

WELLS, J. F., of Cairo, Egypt.

No. 15,585; May 19, 1919.

According to this invention, the material [wood] to be treated is passed into a vertical chamber, and the heat for the distillation of the mass is obtained from the combustion of a substantial proportion of the heavy hydrocarbons that still remain in the material on its arrival at, or approaching, the chamber; the temperature being regulated to produce this effect by varying the speed of the removal of the material and the suction on the outlet of the apparatus; while at the moment when the last portion of the volatile constituents is being consumed, the carbonized material at the bottom of the chamber is withdrawn. As the carbonized material is withdrawn, its place is taken by a portion of the descending fuel from which the lighter volatile constituents have been driven off by the heat from the combustion of the gases or volatile products rising from the bottom of the chamber. The process is thus of a continuous character; and combustion is effected only at the bottom of the carbonizing chamber—the air supply being limited to that required to support combustion. The moment when the last portion of the volatile constituents is being consumed is approximately the moment when the products of combustion show no colour.



Wells' Wood Carbonizing Plant.

Apparatus suitable for carrying out this invention is illustrated diagrammatically in vertical section. It comprises a central shaft or hopper A into which the material to be treated is delivered and falls direct into the carbonizing chamber B. The lower end of this chamber is provided with a grate C inclined downwardly and pivotally mounted opposite to rotatable blades D, which, when rotated, serve to remove the carbonized material from the grate and pass it outward. The hopper is divided into upper and lower chambers E F, separated by a horizontal partition having a central opening. Within the lower chamber is formed an annular space G the depth of the chamber; and into this annular space the products of distillation pass by way of openings H at the upper end of the chamber. The products of distillation are drawn away from the bottom of this annular space by a pipe I.

In the vertical axis of the hopper there is arranged a rod or bar J, provided with projections inclined downwardly. The upper end of the bar passes through a ball-and-socket joint in the cover of the hopper, and is connected with means for reciprocating the bar to push the fuel from the upper into the lower chamber through the opening in the central plate.

When in operation the chambers B and F contain the material under treatment. The volatile products arising are in a state of combustion by the admission of air through the grate; and the products of combustion rise up through the material contained in the chambers, which material is subjected to the heat of the ascending gases, with the result that the lighter volatile constituents are driven off. At the moment when these products show no colour through the grate the paddles D are rotated to withdraw from the bottom of the chamber the charcoal produced, which then passes into the reservoir K containing water. If the material after withdrawal gives off smoke, this is an indication that carbonization is incomplete; and the rotation of the paddles is then arrested for a time. The products of distillation pass into the chamber A, whence they are drawn off by the pipe I.

The working of the apparatus is controlled by regulating the velocity at which the gases are drawn from the chamber G and by the rotation of the paddles.

Gas-Stoves.—No. 149,894.

KOHORN, H., of Vienna.

No. 7494; March 12, 1920. Convention date, Aug. 30, 1919.

This is a modification of patent No. 137,046. The object of the present invention is to simplify the manufacture of the parts to be inserted in the stove to make the manufacture more economical and to increase the heating power.

The supports for the heating tubes and the heat accumulating plates are rigidly secured to the heating tubes or are cast in one piece with them. The tubes can also with advantage be cast on to the side of the gas-conducting chamber, so that in this manner the parts to be inserted are formed in a single rigid whole "having great resisting powers."

Pilot Light for Gas Installations.—No. 150,100.

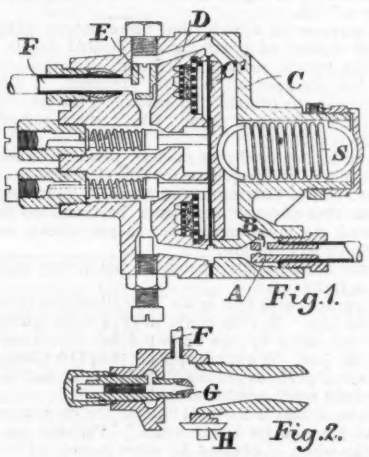
KEITH, J. & G., of Farringdon Avenue, E.C.

No. 14,604; June 10, 1919.

This invention has for its object to prevent the passing into the pilot tube, while the main burner of the lamp is alight, of any gas which may leak past the pilot supply valve when closed, and which "owing to the high temperature attained by the pilot tube in modern high-pressure gas-lamps, would be liable to be decomposed and to cause chokage of the pilot tube due to deposition of carbon.

Broadly, the invention consists in the provision (in conjunction with an automatic lighting device or a cock controlling the lamp) of an injector for the pilot light supply having a connection to the suction side of the main injector of the lamp, whereby leakage that may reach the entrance to the pilot tube may be drawn away by the suction exercised by the main injector.

In patent No. 6395 of 1915 is described an automatic lighting and extinguishing device having a vent passage through which leakage past the pilot valve, when closed, is discharged to the atmosphere. But the present invention obviates certain practical difficulties experienced with the construction referred to, and offers, it is claimed, the "advantages of simplicity and greater certainty of action."



Keith's Pilot Light Fitting.

Fig. 1 is a vertical section of the device according to the invention. Fig. 2 is a section showing a detail.

There is removably fixed to the cover C of the diaphragm chamber a small injector A, through which all the gas flowing through the pilot tube must pass by way of a jet opening in the injector. In the side of the injector beyond the constricted portion is a hole B opening, by way of a port in the cover C, into a chamber between the cover and a plate C^1 at the back of the diaphragm, which plate extends the full width of the diaphragm chamber and is unprovided with a stem—being loaded by a spring S acting directly on it. The chamber between the cover and the plate C^1 is also in communication with the enriching gas-supply tube F by way of a port D and the hollow jet screw E. The tube F supplies enriching gas to the main injector at the moment of opening and closing the automatic lighter, and also carries away any undesired leakage from the pilot valve—being connected to the side of the air chamber of the main injector (as shown in fig. 2) so as to be exposed to the suction set up in the air chamber by the main jet G; the suction being more or less according to the resistance on the air outlet, such as a variation in the position of the shutter H.

In operation—assuming that the main burner is cut off, and only the pilot light is burning—the gas supply, after passing the pilot valve and a check screw, passes through the jet of the injector A, and may draw with it a small proportion of air through the opening B by way of the enriching pipe F, from where it terminates in the main injector of the lamp; the action of the injector sufficing to force the gas or mixture downwards to the pilot tube. When the main injector is in operation

—that is, when the main burner is alight—the suction in the tube F is communicated to the hole in the side of the injector, and, by overcoming the force of any gas in the latter due to leakage, serves to draw away the leakage, and thus positively prevent it from passing into the pilot tube.

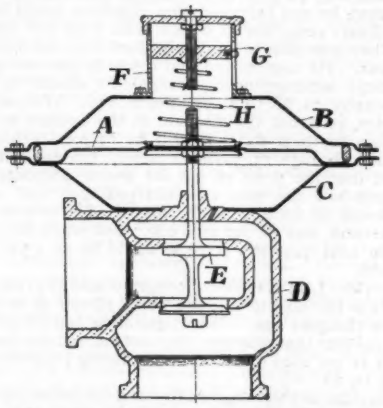
For the purpose of the invention it is not essential that the injector be fitted in the automatic lighting and extinguishing device, though it is convenient; but it is, of course, essential that there be an injector for the pilot light supply, so as to give sufficient energy to the jet to enable it to pump past the opening B without spilling over. Further, it is not essential that the hole in the side of the injector be in communication with the main injector by way of the enriching gas supply-tube F, as a separate connection might be provided.

Diaphragm Gas-Governors.—No. 150,102.

JAMES MILNE AND SON, LTD., and STANIFORTH, H., of Edinburgh.

No. 14,724; Dec. 11, 1919.

This gas pressure controller is of the type in which a flexible diaphragm adapted to operate a control valve is held by a gasket ring clamped between upper and lower cover plates. In such governors for gas-main valves it has been proposed to fit the diaphragm between the flanges of rigid upper and lower castings, the marginal edges of which are clamped together outside the gasket ring. It has, however, been proposed to use a sheet-metal casing with a removable sheet-metal cover—the flexible diaphragm being clamped by a ring-piece within the sheet-metal casing. But, according to the present invention the upper and lower cover plates of the casing are formed resiliently of sheet-metal with flanges, between which is fitted a loose gasket ring securing the diaphragm; the edges of the upper and lower plates being clamped together outside the gasket ring. The plates are preferably pressed or stamped from sheet-metal to a dish-shape or truncated conical form, as by this construction a certain amount of resiliency is obtained, so that the interposed gasket ring mny be readily caused to engage the diaphragm with the necessary pressure when the edges of the sheet-metal parts are clamped together.



Staniforth's (Milne and Son's) Diaphragm Gas-Governor.

A vertical section through such a spring-controlled diaphragm governor is shown.

The diaphragm A (of leather or like material) is held between top and bottom covers B and C, secured together with a loose metal gasket ring between so as to ensure the necessary gas-tightness. The bottom cover is fitted to a cast-brass valve body D having a valve E, the stem of which is adjustably connected to the diaphragm by nuts on the threaded valve stem. The top cover is fitted with a cylindrical portion F, having a plate G adjustable on a screwed stud for the purpose of regulating the pressure of a spring on the diaphragm.

Gas-Heated Radiators.—No. 150,246.

NORTH, W. C., of Leicester.

No. 9781; April 7, 1920.

This radiator comprises an inverted hollow conical chamber (into which gas, or a mixture of air and gas, is conducted) having a perforated wall to allow the air and gas mixture to pass away in small streams, which, when ignited upon the outer side of the chamber "in the form of well-distributed small blue jets," give forth heat, which is absorbed by the wall of the chamber and converted in radiant heat. The hollow cone has a flat base completely closing it, or it can be used inverted, with the flat "base" at the top.

Lighting in Adelaide.—The 1919 report of the City of Adelaide states that the bulk of the street lighting contracts with the South Australia Gas Company and the Adelaide Electric Supply Company expired during the year. The contract with the South Australian Gas Company was renewed until Aug. 31, 1922, at increased rates. The new contract provides for the alteration of some 269 "Graetzin" inverted burner gas-lamps to the ordinary "Welsbach" upright burner type. The diffusive lighting power of the inverted lamps was not considered equal to that of the upright type; and for this reason the alteration was agreed to. During the year the street-lighting services, both gas and electric, were curtailed in the city streets, owing to shortage of coal, which resulted from the seamen's strike. To compensate for this loss of lighting, a rebate was made by the Companies.

MISCELLANEOUS NEWS.

THE NEW METHOD OF CHARGING FOR GAS.

South Metropolitan Gas Company's Explanation.

The following explanation of the new method of selling gas by the therm has been circulated among the consumers of the South Metropolitan Gas Company.

It was not until many years after the introduction of gas (Pall Mall was first illuminated with it in 1807) that it was used for any other purpose than providing light by its combustion. Hence all public supplies had to conform to certain standards of illuminating power. With the introduction of the incandescent burner, the luminosity of the flame became less important than its heating power, although both qualities have their uses. It was, therefore, only a question of time for gas to be sold on the basis of its heating, rather than its lighting, value. This change has now been brought about by Act of Parliament; and gas will in future be sold not at so much per 1000 c.ft., but at so much per therm. A therm is the name given to 100,000 B.Th.U. One thermal unit is the amount of heat absorbed in raising 1 lb. of water 1° Fahr.

The Company is now required to declare the heating value of its gas; and the London County Council is required to ascertain by a system of tests that this declaration is complied with. This Company's gas is declared to contain 550 B.Th.U. per cubic foot. To ascertain the number of therms used, it is only necessary to multiply the number of cubic feet consumed by the declared heating value of the gas, and divide the result by 100,000. For example:

14,000 c.ft. × 550 and divided by 100,000 = 77 therms.

The rental for slot meters and their appliances will also be at the rate of so much per therm.

From the date of reading the meters for the Michaelmas quarter, the price charged for gas will be 10½d. per therm, and for the full slot-meter service an additional 1¾d. per therm.

These prices are equivalent to an increase on the current rates of approximately 1¾d. and ¼d. per 1000 c.ft. respectively, and have been necessitated by the increased cost of labour and materials since they were last fixed.

It is important to bear in mind that the heating value of the therm is between twenty-nine and thirty times as great as that of a Board of Trade unit of electricity—the proportion being as 100,000 is to 3420.

(Signed) F. M'LEOD, Secretary.

709, Old Kent Road, S.E. 15,
September, 1920.

AUSTRALIAN GAS-LIGHT COMPANY.

The Annual General Meeting of this Company was held at the Royal Exchange, Sydney, on Monday, Aug. 9. Mr. GEO. J. COHEN (the Chairman of the Company) presided.

The SECRETARY (Mr. C. U. B. Gurnett, A.C.I.S.) having read the advertisement convening the meeting, the report of the Directors was taken as read. It stated that the net profits for the half year, including the balance brought forward, amounted to £95,878. The Directors recommended payment of a dividend for the six months of 4 p.ct. on the old "A" and "B" shares, and in proportion on the new "A" shares, which would absorb £80,692; leaving a balance to be carried forward of £15,186. As intimated in the last report, the "B" and "C" debentures which matured last January and February were re-issued with a currency of five years as from the latter date, bearing interest at the rate of 6 p.ct. per annum. Of the total amount (£800,000) the sum of £61,700 was not taken up.

The CHAIRMAN, moving the adoption of the report, said he was pleased that during the past half year there was a very satisfactory increase in the consumption of gas—14·6 p.ct. over the corresponding period of last year. The gas consumers now numbered 154,493; the net increase being 3787. The total number of gas cookers sold to date amounted to 52,003; the sales for the half year being 759. While on the matter of cookers, he drew attention to the new arrangement introduced, extending the time-payment system to all gas-consuming appliances other than sundry fittings. There were 8442 public lights at present in use—71 having been added during the half year. Owing to increased costs, it had been found necessary to make an increased charge for this service, which would come into operation as from the end of the current year. During the past six months, 40 miles of mains and services were laid; the total mileage to date being 3597. A noticeable feature of the half-year's operations was the increased return from residuals. In this connection, he referred to the fact that the demand for the Company's tar and tar products continued to grow. While the greater portion of these commodities was used within Australia, there was a ready demand outside the Commonwealth, which was only restricted because of the limited shipping facilities. At the last half-yearly meeting, he referred to the shortage of meters, and to the fact that it was found necessary to establish a "flat-rate." He also mentioned that the flat-rate was not a system of charging which would appeal either to the Company or to the consumer, and that it would be discontinued as soon as possible. He was pleased to say that the early abandonment of the system was now contemplated. Large purchases of meters had been arranged for; and it was hoped that these would be delivered and installed during the next few months. Considerable difficulty had been experienced in obtaining oil supplies. During a portion of the six months, the Company were obliged to rely upon crude oils, obtained in the distillation of coal tar—thereby easing a most difficult situation. Negotiations were, however, in progress which would ensure a supply of gas-making oil for some time ahead, although at a much higher price than had ever been paid before. On the occasion of the last meeting, he (the Chairman) also referred to the extensions which were to be carried out to the Mortlake works.

These were now in hand, and included coal and coke wharves, coal-handling and storage plants, carbonizing plant, and residuals plant. Owing to the difficulties in connection with the completion of the necessary extensions referred to above (particularly in procuring materials), it was found imperative to re-commission the Kent Street works in May last. The shareholders would appreciate the efforts which had been made by the Company to prevent a disturbance similar to that which recently occurred in Melbourne. After some weeks of discussion between representatives of the Sydney and Newcastle Gas Companies, and representatives of the New South Wales Branch of the Federated Gas Employees' Industrial Union, claims covering all divisions of the Company's work had been settled, which would entail a further addition to the wages bill of at least £60,000 a year. A Conciliation Committee had also been constituted, which it was hoped and felt would conduce to a period of peace within the industry. It was a matter of extreme regret that, owing to the increased cost of coal, oil, and labour, the Company would shortly be compelled to make a further application for an increase in the price of gas.

The report was adopted, and a dividend for the half year was declared at the rate of 4 p.ct. on the old "A" and "B" shares and in proportion on the new "A" shares. It was decided to increase the remuneration paid to the Directors by £750 per annum. The retiring Directors and Auditors were re-elected, and the proceedings concluded with a vote of thanks to the Directors and officers for their services.

ST. PANCRAS AND AUTOMATIC LIGHTING.

The Lighting Committee of the St. Pancras Borough Council report that their attention has been called to the automatic lighting and extinguishing controllers for street-lamps which are successfully in use in over 180 towns in the United Kingdom, and have resulted in effecting a large saving in labour and gas consumption.

The Chief Clerk was instructed to make inquiries; and he shows that the cost of installing such controllers in the borough would be £3529; being £2 2s. for each of the 1582 lamps, and 2s. 6d. each for fixing the controllers. The present cost of lighting, extinguishing, and cleaning is £4049 per annum. The cleaning of the lamps twice a week and fixing new mantles occupies, approximately, twenty hours per man. If a 47-hour week was worked, only nine men would be required and one foreman. It might be necessary to employ for a temporary period an assistant fitter, to supervise the winding of the clocks, until the men were accustomed to the work. The wages would then be £2258 a year. Add gas company's charges for pilot-lights, £606, giving a total of £2864. The charge of £606 for pilot-lights is based on a consumption of one-third of a cubic foot per hour; but this, he thinks, can be reduced. The makers repair any controllers up to a period of two years free of charge, and after that charge a fixed price of 2s. 6d. for any controller that may require overhauling and repair. He has not considered this in the cost of upkeep, as no doubt this will be saved by the less number of mantles broken when lighting-up with the torch, which would no longer be needed if the automatic controller were adopted. These controllers have been in operation for a number of years in over 180 towns, and have proved reliable and satisfactory; and in the event of the Council adopting them, it is shown that the capital outlay would be liquidated in about three years, and after that it would result in a saving of about £1200 per annum, and would enable a 47-hour working week to be adopted, which is asked for on behalf of the lamplighters. There are other important advantages in adopting the system. At present it takes one hour from the first lamp to the last in lighting-up and extinguishing; and if the lamps are automatically lighted and turned-out at a fixed time, considerable economy can be effected in the consumption of gas—roughly, about £500 per annum. Alternatively, the Company are prepared to hire-out the controllers for a period of not less than five years, at a price of 6s. per annum per controller—the total of which would represent about £480 per annum, or about £2400 for the five years. He has thoroughly investigated the mechanism of the controller, and has every confidence in recommending its adoption.

The Committee say it will be observed that the installation of the automatic controllers will result in an estimated saving of about £1200 per annum; and there will also be a reduction representing approximately £500 per annum in the consumption of gas. The services of thirteen lamplighters and two foremen lamplighters will, however, no longer be required. They have inspected a lamp which has been fitted with the device, and are satisfied that the installation would work satisfactorily. In view of the economy that will be effected, they have come to the conclusion that the system should be put into operation in the borough. They have had regard to the labour which the system will displace; and, in view of possible unemployment during the winter, they do not propose that the scheme should be put into effect until the spring of next year, by which time it is hoped the services of the men which the scheme displaces will be absorbed in other directions.

Brentford Gas Company's Charges.—The Brentford Gas Company have applied to the Board of Trade to vary the Company's Order so as to allow them to increase the price of gas from 4s. 10d. to 5s. 4d. per 1000 c.ft. The Twickenham District Council have lodged objection to the proposal, and have instructed accountants to make an examination of the Company's accounts.

Manchester Coal-Purchasing Department.—The first meeting has been held of the Manchester Corporation Central Coal-Purchasing Department, which consists of members of the Gas, Electricity, Baths, and Water Committees. Alderman Kay (the Chairman of the Gas Committee) was appointed Chairman, and Councillor R. J. Davies, Deputy-Chairman. The idea is that the new department shall purchase all the coal required by the Committees direct from the collieries; and instructions were given for the collection of statistical and other information necessary.

INCREASE IN THE PRICE OF GAS IN EDINBURGH.

The Edinburgh and Leith Gas Commissioners decided on Monday to increase the charge for gas by 4d. per 1000 c.ft. for the half year to April-May next, making the rate to the ordinary consumer in Edinburgh and Leith 5s. 4d.—exactly twice the pre-war rate—and the average net rate (after deduction of discounts) 5s. 1d.

In a memorandum accompanying the estimate, attention is drawn to some of the large increases in the estimated expenses for the current year as compared with 1914-15:

	1914-15.		1920-21.
Wages	£68,846	..	£194,560
Materials	22,159	..	49,852
Coals	118,349	..	338,193
Rates and taxes	19,655	..	79,000
	£229,009	..	£661,605

The estimated revenue for 1920-21 (including a credit balance from last year) is £804,652, and the expenditure (including all charges in respect of capital, &c.) £804,455. Coal is expected to cost £92,101 more, a large part of which (£60,213) will, it is anticipated, be recovered from the enhanced value of residuals.

CHEAP GAS AT STOCKTON-ON-TEES.

"The Blue Riband of the Municipal World."

A substantial reduction in the price of gas was reported at a meeting of the Stockton-on-Tees Town Council on Tuesday of last week.

Alderman Sir JOHN HARRISON said the business at the gas-works had been most successfully carried out, with the result that a considerable amount of money had been made. The Gas Committee therefore recommended that the discount upon gas accounts for the quarter ending the 30th inst. should be increased from 10 to 50 p.ct. to ordinary consumers, and that 40 p.ct. be allowed to power users. With the 50 p.ct. discount, he was informed that Stockton would be supplying gas to the ordinary consumer at a less price than any other place in England. They were able to do this because they could sell residuals at higher prices. He also moved that the price per 1000 c.ft. for gas supplied through ordinary meters, from Oct. 1 should be: Stockton, 1s. 6d.; Thornaby, 1s. 6d.; Eaglescliffe, 1s. 11d.; Wolviston, 2s. 3d.; and Billingham, 2s.; that the discount on the amount so due (upon payment within fourteen days) should be 15 p.ct.; that in regard to gas supplied through prepayment meters, the discount should be 50 p.ct.; and that the price of gas for power purposes should be reduced to one-half the sum now charged, but that no discount should be allowed off these reduced charges. The present price, said Alderman Harrison, was 3s. per 1000 c.ft.; and when the 15 p.ct. was deducted from next quarter's price, it would be 1s. 3·3d., which was very low indeed.

The MAYOR (Mr. J. M'Naughton) congratulated the Gas Committee that they were at last able to take the "blue riband of the municipal world" for the cheapest gas. The outstanding feature of the whole business was the fact that whereas they commenced the year with the price of gas at 4s. per 1000 c.ft., they were, during the present quarter, only charging 1s. 1d.

The recommendations were agreed to; and the following suggestions were also approved: That the price of coke to domestic consumers inside the parliamentary borough remain as at present, 36s. 8d. per ton; that the price to domestic consumers outside be increased from 48s. 4d. to 53s. 4d.; that the price to industrial consumers inside the parliamentary borough be increased from 67s. 6d. to 75s.; and that the price to industrial consumers outside be increased from 67s. 6d. to 85s.

LINCOLN CORPORATION ACCOUNTS.

Saving by Water Gas.

The accounts of the Lincoln Corporation gas undertaking for the year ended March 31 show a net profit of £4362. The report of the Gas Manager (Mr. W. H. Mainwaring) states that the outstanding feature of the year has been the acute shortage of coal, intensified by two strikes affecting delivery.

The gas made during the year was 423,407,000 c.ft., an increase on last year of 5,444,000 c.ft. More than half of this is due to extended use of the public lamps. Nearly the whole of the increased quantity has been made by their carburetted water-gas plant, which they are still urgently requested by the Controller of Coal Mines to utilize to the fullest possible extent. Though the quantity of gas is greater, the amount of coal used is 806 tons less than in the previous year. The saving of coal represented by the make of water gas during the year is 5326 tons, and 1156 tons of coke were used in the process of its manufacture. Instead of 2½ gallons of gas oil per 1000 c.ft. as formerly, they are now using ½ gallon only, owing to the excessive cost of oil; and for this reason it is necessary to use incandescent burners to obtain satisfactory results. It is admitted by competent authorities that gas of similar quality to that supplied in Lincoln, and generally throughout the greater part of the country is, except with flat-flame burners, quite as efficient as that distributed before the war; while it can be supplied at a cheaper rate, and does not involve an extravagant use of coal or oil for its manufacture. It is essential, however, that the pressure shall be sufficient, and the burners and other apparatus for its consumption clean and properly adjusted. The great majority of complaints are due to one or the other of these causes.

With the re-organization of the distribution department, it has been possible to take in hand the improvement of the supply of gas in various parts of the city, which have long needed attention. Some-

thing has been done in this direction; but much remains to be accomplished, and this at a period when the cost of such work is altogether abnormal. Difficulty is experienced in obtaining delivery of new mains, &c., owing to the demand.

During the year a Joint Industrial Council for the gas industry has been established; and the claims of labour are now considered from a national standpoint. In this connection, it may be observed that the wages and conditions of the employees are well in advance of those current in the district to which Lincoln is attached. The hours of shift-men on the works have recently been altered, by mutual agreement, to an eight-hours' basis, in accordance with general practice.

The advisability of an early application to the Board of Trade for powers to increase the maximum price of 4s. per 1000 c.ft. is apparent, in view of the present rate of charge of 3s. 9d., and the continued increase of the cost of labour and materials.

TAR-TANK FIRE AT SYDENHAM.

A district fire brigade call followed early last Thursday afternoon upon an explosion and the ignition of the contents of a 20,000 gallon tar-tank at the Lower Sydenham works of the South Suburban Gas Company. Fortunately, only one man in the works was injured; and the damage caused by the fire was only slight, and wholly confined to the tank. The injured man was a tar-tank attendant, who was found with his clothing on fire, and taken to hospital with burns on the face and arms.

The tank, which was provided with a concrete cover level with the ground, is situated near the railway, some distance from the Company's offices. Other tanks are in close proximity, and buildings and holders only a short distance off. The explosion which preceded the outbreak blew off the top of the tank.

A SPECIAL LUBRICATING OIL FOR USE WITH BENZOLE AND OTHER MOTOR FUELS.

The National Benzole Company have received so many communications from motorists on the subject of "correct lubrication" for internal combustion engines when benzole or motor spirit containing a percentage of benzole is used as a motor fuel, that they have decided, in order to be able to guarantee a brand which will do justice to home-produced fuel, to market a pure oil specially prepared to allow the maximum miles per gallon to be obtained. The "N.B.C." brands of oil, of which there are two, known as "Medium" and "Heavy," contain all the essentials necessary to give perfect lubrication to the various types of engines constructed for use in both cars and lorries.

A great deal has been stated by correspondents in the press at various times about the deleterious effect some benzole has upon the various parts of an internal combustion engine; and after very exhaustive examination of the subject, it has been traced in every case to either bad carburation or faulty lubrication. Certain oils contain properties not suitable to come in contact with benzole vapour, and therefore should not be a constituent of the lubricating oil, as the efficiency of the oil is likely to be affected, with disastrous results to the engine.

Ideal lubrication necessitates the use of an oil of just the right consistency to act as a cushion between all moving metal parts when the engine is running. It is also equally important that the oil should form a gas-tight joint between the piston-rings and the walls of the cylinder, to prevent the escape of generated gas. The viscosity must be well maintained, as otherwise lubrication would be impaired at various temperatures. It is claimed by the National Benzole Company that all these points have been carefully considered in the production of their lubricating oils, which should always be used to obtain the maximum miles per gallon from the motor spirit used. "N.B.C." lubricating oils are just as suitable for use with other motor fuels.

Arrangements are being made with approved garages to supply direct to users from barrels, in order to avoid the necessity of providing and charging the cost of a can on each occasion a small quantity of oil is required. The retail prices are therefore less than other first-grade oils, and are:

1 gallon	9s. 9d.	From approved garages with bulk supply.
½ ,,	5 6	
1 quart	3 0	

For customers requiring a larger supply, free delivery will be made to any address within the railway companies' delivery radius, as follows:

40 gallon barrels	7s. 6d. per gallon
10 ,, drums	8 6 ,, ,,
5 ,, ,,	8 9 ,, ,,

No charge is made for package. "Medium" and "Heavy" brands are the same price.

An interesting booklet giving more detailed particulars is supplied gratis by the producers—the National Benzole Company, Ltd., No. 30, Grosvenor Gardens, S.W.

Nottingham's Big Electrical Scheme.—The Electricity Commissioners have sanctioned the Nottingham Corporation scheme for the construction of a large generating station on the banks of the Trent. The cost of the first section of the scheme will be £750,000; and the whole undertaking will involve an outlay of £1,500,000. Power will be supplied to a number of smaller districts in the neighbourhood of the city.

Gas Consumption at Blackpool.—The consumption of gas in Blackpool continues to increase. It was reported on the 23rd inst. that the gas output for the previous month was 78,771,000 c.ft., an increase of 4,634,000 c.ft. on the corresponding period of 1919. From the commencement of the departmental year, the total output was 401,658,000 c.ft., compared with 380,086,000 c.ft. last year, so that during 23 weeks this year Blackpool has consumed 21½ million c.ft. more gas than a year ago—an increase of nearly 1,000,000 c.ft. a week.

DEVELOPMENT OF GAS-POWER.

Writing in the "Manchester Guardian," Mr. John D. Troup says there are many indications that at last we are at the beginning of the gas-power era. For many years past, eminent scientists have preached the gospel of the more scientific use of our coal resources; but for various reasons little progress was made on any extensive scale. The principal reason for clinging to old methods was doubtless the low price of coal; but now that the price per ton has more than trebled, we have realized the necessity for taking stock of the whole field of power and heating problems, and the greater need for economy to-day has helped to make this matter of still more importance. Probably one of the most important achievements is the erecting of the large experimental fuel station in London, where practical tests will be carried out on every possible fuel—solid, liquid, or gaseous.

The development of gas-power is dependent on the more general carbonization of coal, and there can be little doubt that we are about to witness big developments along these lines. The recent Act of Parliament giving authority for the supply of gas on a heat-unit basis in place of a candle-power basis will enable gas-works to re-organize to produce gas on a more economical basis, and so extend their present activities. Then there are the developments in low-temperature carbonization by quite another organization; and already several very large plants are being installed. Then, again, there are the increasing use of coke-oven gas for town supply, the great developments in gas heating for furnace work, and developments in gas producers.

Turning to the actual plants in operation, the modern bye-product coke-oven may be taken as the pioneer gas plant for supplying large volumes of gas for industrial purposes. During the process of coke-making, the valuable bye-products of the coal are recovered, including the rich gas, which is distilled off. Approximately one-half of this gas is used for heating the coke-oven itself, and the remainder is available for outside purposes. Advantage has been taken of this supply to feed the industries in the locality of the works, and also to supplement the local gas-works supply. The town of Middlesbrough receives its gas supply almost wholly from the district coke-ovens. During the war a gas-main was laid between the Tinsley Park Colliery, near Sheffield, and one of the town's gas-works. This particular works now receives some 25 p.ct. of its production from the colliery coke-ovens. It is instructive to note in this case that the colliery has now stopped sending 30,000 tons of coal per annum to the gas-works, but sends the equivalent of 40,000 to 50,000 tons in the form of gas. This example gives a very good idea of how gas distribution effects economy in transport.

Low-temperature distillation of coal is a comparatively new process which opens up huge possibilities for the industrial supply of gaseous fuel. The principal concern developing this system on a commercial basis is Low-Temperature Carbonization, Ltd. They already supply the Yorkshire Electric Power Company with gas for firing their steam-boilers from the plant at Barnsley; and this plant will carbonize some 500 tons of coal per day. Negotiations are being completed for large plants at Glasgow and Sheffield, showing that considerable progress has already been made.

Like all other branches of the motor-power problem, there can be no one type of gas-producing plant which is capable of universal adoption. The reason for this is principally the great differences in the various fuels. The large gas-producer, therefore, continues to make progress.

A great deal of experience has been gained in applying gas for steam-raising, and special burners have been evolved for the purpose. But it is probable with the more universal adoption of gaseous fuel that boiler design will undergo some changes. An example of special design is that making use of the principle of surface combustion in the Bonecourt boiler, which has given efficiencies of over 90 p.ct. The economies to be effected by gas-firing boilers are very similar to those obtained by oil-firing. Owing to the more perfect control of the air supply with gas-firing, the efficiency of the boiler furnace is much greater than with coal firing, and the temperature is constant and higher than with coal; and, in addition, peak loads can be taken more rapidly. For these reasons the capacity of the boiler is increased, which means that a lower capital outlay is required in the case of gas-firing. Capital is also saved by the elimination of coal and ash-handling plant, and the ground space occupied by these and the coal and ash; and there is a considerable saving in labour.

The uses of gas for furnace and heating work are too numerous to mention in a short article. There is scarcely any industry which does not now use gas for some section of its operations—such as annealing, heat treatment of steel, tempering, welding, melting metals, brazing, soldering, japanning ovens, sugar boilers, thread singeing, hat presses, and ironing.

The modern gas-engine, made in sizes up to 6000 H P., is capable of using every class of gas which is at present available. Gas can be used much more efficiently in the cylinder of an engine than when burnt under a steam-boiler; but so far the gas-engine has a limited field of application. Gas-engine design has settled down to three principal classes—namely, the slow-speed horizontal type, the vertical slow-speed type, and the high-speed enclosed engine. There is no industrial process where the gas-engine cannot be successfully applied from a practical point of view.

Finally, there is the problem of gas distribution. The present method of low-pressure distribution will gradually be replaced, or at least supplemented, by high-pressure gas-mains, so as to reduce the capital sunk underground. The question of this distribution is of great importance, because the higher its efficiency the greater will be the saving over the present cost of transporting the solid coal. The total cost of high-pressure gas distribution would appear to compare very favourably with similar capacity electric distribution, and it is possible the gas system would be the cheaper; so that there would appear very little hope of electricity replacing gas as a heating agent.

The Prague Municipality have contracted with a French firm for the installation of a new system of gas lighting and heating in the city.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Sept.* 27.

The London tar products market remains very firm. Pitch for home trade and for export is in demand, shipments are proceeding, and the price is about 22 3s. net per ton f.o.b. makers' works. Creosote is worth 1s. 4d. net in bulk at works. Benzole, toluol, and solvent naphtha remain in considerable demand at unchanged prices.

There is nothing to report as to sulphate of ammonia for home agriculture.

Tar Products in the Provinces.

Sept. 27.

The average values for gas-works' products during the week were: Gas-works coal tar, 121s. 6d. to 126s. 6d. Pitch, East Coast, 217s. 6d. to 220s. per ton f.a.s.; West Coast—Manchester, 191s. to 195s 6d.; Liverpool, 191s. to 195s. 6d.; Clyde, 191s. to 195s. 6d. nominal. Benzole 90 p.ct. North, 2s. 6d. to 2s. 7d.; crude 65 p.ct. at 120° C., 2s. 3d. to 2s. 5d. naked at makers' works; 50-90 p.ct. naked, North, 2s 4d. to 2s. 6d. Toluol, naked, North, 2s. 6d. to 2s. 7d. nominal. Coal tar crude naphtha in bulk, North, 11½d. to 1s. Solvent naphtha, naked, North, 3s. to 3s. 2d. Heavy naphtha, North, 3s. 4d. to 3s. 6d. Creosote, in bulk, North, liquid, 1s. to 1s. 0½d.; salty, 11½d. to 1s. Heavy oils, in bulk, North, 1s. to 1s. 0½d. Carbolic acid, 60 p.ct., 3s. 11d. to 4s. Naphthalene, £40; salts, £9 to £9 10s., bags included. Anthracene, "A" quality, 1s. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

Both producers and consumers are merely marking-time; and in any case the former are not inclined to commit themselves for future delivery. Business has thus been almost suspended pending the coal strike or its settlement. There has been, however, no weakening of prices, where they have been mentioned; on the contrary, the tendency has been the other way. Pitch is extremely firm, with the expectation of higher prices as the winter comes on. The demand for briquettes from the Continent is as insistent as ever; and there does not seem any prospect of its falling off. Naphthalenes are still very scarce and strong; and although there is not much business passing, this is because there is not much available. Prices are about as last quoted. Cresylic acid is steady. The demand for crude carbolic acid has become very poor; and it is doubtful if 3s. 6d. per gallon could be obtained for 60s. The crystal market has been upset by the return of some parcels from Japan. Solvent naphtha has been rather more inquired for. There does not appear to be any increased demand from users; and the movement is ascribed to speculation in anticipation of a strike. Benzole is strong. A coal strike would mean the closing-down of the coke-ovens—the biggest sources of supply; hence the anxiety of large users of motor spirit to lay in large stocks. The closing-down of coke-ovens would mean a great loss to the owners, as the lining of the ovens contracts and falls to pieces, and heavy outlay is necessary before the plant is of further use.

The range of quotations is as follows:

Benzole: 90% London 2s. 5d. to 2s. 7d., North 2s. 4d. to 2s. 6d.; 50-90% 2s. 3d. to 2s. 4d. London, 2s. 2d. to 2s. 3d. North; crude 60-65%, 1s. 6d. to 1s. 8d.; pure, 4s. per gallon naked.

Crude Tar: London, 105s. to 115s.; Midlands, 107s. 6d. to 117s. 6d.; North, 105s. to 115s. per ton *ex* works. Refined tar, 95s. per barrel (free) on rail.

Pitch: London, 220s. per ton f.o.b.; East Coast, 215s. per ton; West Coast, 205s., with Manchester 200s. per ton, and Glasgow 210s. per ton; South Wales, 222s. 6d. per ton.

Solvent Naphtha: London, 2s. 10d. to 3s.; Provinces average 2s. 9d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 6d. per gallon.

Naphthalene: Refined flake, £60 per ton nominal; inferior, £35; crude, £16 to £30 per ton, according to quality.

Toluol: Naked, 2s. 11d. per gallon nominal. North, 2s. 9d. Pure, 4s.

Creosote: London, 1s. 1½d. to 1s. 2½d.; North, 1s. 1½d.; heavy oil, 10½d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Pyridine: 20s. to 25s. per gallon.

Aniline Oil: 1s. 11d. per lb., drums extra.

Aniline Salts: 2s. 2d. per lb.

Cresylic Acid: 95%, 4s. 9d. to 5s. 3d.; 97-99%, 5s. 6d. to 5s. 9d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 3s. 4d. per gallon; crystals 40%, 9d. per lb. nominal.

Salicylic Acid: Technical, 2s. 7d.; B.P., 3s. 3d. per lb.

Xylol: Pure, 6s. 9d.; commercial, 5s. 9d. per gallon.

Sulphate of Ammonia.

A very fair amount of business is being done for forward delivery. Buying has been most pronounced for February-March; but there is a fair trade for October and November general fertilizer needs. The export trade is still good at about £45 per ton, but is not specially assisted by the practical drying-up of some leading pre-war markets. From America comes news that conditions are largely unchanged; but more active trading is looked for very shortly. On the Pacific side, the tendency is reported to be towards higher prices for autumn delivery. Japanese competition has apparently died out.

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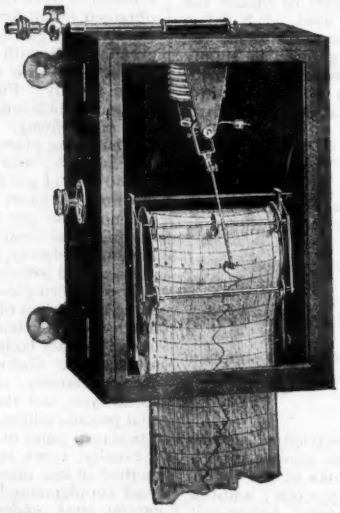
TAPE CHART PATTERN

For Pressure or Vacuum.

NO LIQUIDS USED.

The chart roll is renewed 6 times a year.



The record can be torn off at any interval.

Lowest Range: 0-2 inches water.

Highest Range: 0-300 lbs. per sq. inch.

Suitable for Gas, Air, Water, or Steam, and may be used on Crude Gas.

MAKERS:

ALEXANDER WRIGHT & Co., Ltd., WESTMINSTER

Halesworth Gas Company, Ltd.

At the annual general meeting of the Company (which was held at the Offices, No. 54, Conduit Street, W., on the 20th inst.), Mr. Charles Comins, the Chairman, in moving the adoption of the report and accounts for the year to June 30, informed the shareholders that the Company, during the past year, had considerably improved their financial position. An issue of £5000 in 8 p.ct. participating preferred ordinary shares had been made, which would provide funds sufficient to pay for the extensions that had been carried out at the works during the past three years. The period of reconstruction, which had been commenced in 1916, might be said to have come to an end; and the works were now fully equipped with an up-to-date plant, and well able to meet all the demands of the district for the supply of gas for some time to come. One of the old holders had been dismantled; and the erection of the new holder was completed. The purifiers which had been taken out, it was interesting to know, had been in constant work over a period of 82 years. The new purifiers were much larger, and of an improved pattern, which would considerably facilitate the purification of the gas. The sales for the past year showed an increase of nearly 10 p.ct.; and, in the difficult circumstances, the Directors considered this to be a very satisfactory result. The Town Council had in hand an important housing scheme, under which it was proposed to build a number of new houses. The Gas Company were prepared to lay a 4-in. main so as to give an adequate supply of gas to the new houses; and an estimate had been submitted to the Housing Committee for the installation of pipes and fittings. The report and accounts were unanimously passed.

The Cost of Gas-Burners.—The Walsall Gas Committee state that the Engineer (Mr. B. W. Smith) has reported that the lowest price at which the Committee could sell an upright incandescent burner, mantle, and chimney was 3s. 4d., and an inverted burner complete from 8s. 6d. to 12s. 6d.; and the cost of maintaining the same would be practically 1s. per burner per quarter, with a minimum charge of 3s. a quarter. If burners, mantles, and chimneys were required, they would be charged separately, according to the price on the market.

Steam Coal for Gas Making.—At a meeting of the Droitwich Town Council last week, Mr. Bourne inquired what had been the matter with the gas of late, and complained of the abominable smell, which was apparent all over the borough. The Chairman said it was the fault of the Government, who were supplying a quality of coal from which they could not make gas. This was the cause of all the trouble. The Manager (Mr. W. H. Wise) said they were receiving steam coal, which was useless to them. It came from Staffordshire, and was not a gas coal at all. Their purifiers in the ordinary way were not changed more than once in six months; but now they needed to be changed every half-day.

Lurgan Gas-Works.—The question of repairs, &c., at the gas-works was again before the Lurgan Urban District Council, when Mr. J. A. Tallentire (the Manager) submitted an estimate for £6545, with 10 p.ct. for contingencies, making a total of about £7000. It was decided to apply to the Local Government Board for Ireland for sanction to a loan of £7200. Mr. Tallentire said that no gas could be made while the work was being carried out—a period of about two months.

Price of Electricity at Hastings.—The Emergency Committee of the Hastings Town Council, having regard to the adverse financial position in which the electricity undertaking will be placed by reason of the payment of further increased wages to the employees under the recent awards of the Electricity Whitley Councils, have instructed the Town Clerk to make application to the Electricity Commissioners for an Order to modify further the provisions of the Hastings Corporation Electric Lighting Order, 1898, so as to admit of the authorized maximum charge for electricity being increased from the present price of 10d. per unit, fixed by the Hastings Electricity (Temporary Increase of Charges) Order, 1919, to 1s. per unit.

At Banff, the Gas Company are raising the charge for gas by 1d. per 100 c.ft.

Recent Yorkshire wills proved include that of the late Joseph Hanson, of Church Street, Guiseley, described in the will as a labourer, but in the death notice as a gas stoker, who left £1379.

By the gas which escaped while workmen were fitting a new valve on one of the gas-mains at Alloa, twelve persons were more or less affected. Several of them are said to have been rendered unconscious.

The Port Glasgow Town Council have received permission from the Secretary for Scotland to borrow £50,000, to complete the new gas-works, and for other general purposes in connection with the department.

With the maximum price of 8s. 6d. per 1000 c.ft. for gas sanctioned by the Order under the Temporary Increase of Charges Act of the Annfield Plain and District Gas Company, the dividend allowed for the current year is at the rate of 5¼ p.ct. per annum.

At the Bradford Coroner's Court, an inquiry was held concerning the death of Clara Rawling, who was found lying on the bed with a tube in her mouth attached to a bracket with the gas turned on. The husband said she had been depressed, and had twice before attempted suicide.

Mr. J. H. Newton, A.C.A., has issued a report in which he briefly reviews the year's work of the Bolton Corporation Trading Departments. Regarding the gas-works, he shows that the gross profit was £78,544, against £69,520 in the preceding year, though it was not possible to hand over anything in relief of the rates, to which £4000 was contributed in 1919.

The "Elite" Gas Interior.

A complete Gas Interior of pleasing design in the Tudor style.

Embodies the patent silent burner, injector, and other internal details of the noted "Entente" Fire.

When conditions permit the fitting of a complete Gas Interior the "Elite" will give entire satisfaction.

We are exhibiting at the Housing and Health Exhibition, Kelvin Hall, Glasgow, 15th Sept. to 9th Oct. We shall be pleased to see you at our stand.

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WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 6, Narrow Wine Street, BRISTOL; 333, Queen Street, MELBOURNE.

Gas for Housing Schemes.—The Burnley Housing Committee suggest that gas-cookers, gas-boilers, and gas-fires should be installed in the Corporation houses, in place of coal apparatus. As an experiment, the first pair of houses are to be fitted with gas; and the relative costs will then be compared.

Gas-Fitters and Plumbers' Wages.—The Wombwell Urban District Council have referred back to the Gas Committee a recommendation in regard to the wages of gas-fitters. The men had applied to be paid at the district rate applicable to plumbers. The Committee recommended that the application be not granted, but that in future any gas-fitter engaged on plumbers' work should be paid plumbers' wages. It was reported that, as a result of this decision, one fitter had left the Council's employ; and several councillors said others would do the same.

Lantern Slides of Gas Appliances for Lectures.—The Richmond Gas Stove and Meter Company, of Nos. 164-172, Queen Victoria Street, E.C., inform us that they have a very large selection of lantern slides of installations of gas appliances for various uses—including a complete collection showing gas employed for factory and industrial purposes. They have in recent years made a point of collecting illustrations of every fresh application of gas that came to their notice. They offer these slides for the use of any engineers or others who would find them helpful for lectures.

Soaping Defective Gas-Fittings.—At an inquest at Morecambe, on Mrs. Agnes Hill, of Leeds, the evidence showed that death was due to illness caused probably by gas poisoning in slight doses over a long period. It transpired that there had been a small leakage in the bedroom at Leeds about last Whitsuntide; and it had been soaped-up. Dr. Hogarth stated that soaping was of no use; and though the gas had now gone out of deceased's system, she had probably died from its effects on her health. One p.ct. of gas in a bedroom over a fairly long period was sufficient to prove fatal. The husband had been unaffected, because he slept nearer the window.

South Metropolitan Company's Superheated Burner.—The Lambeth Housing Committee report that a plan has been submitted by the South Metropolitan Gas Company, showing the proposed arrangement of lighting on two new roads at Herne Hill now in course of formation. This consists of thirteen new lamps, spaced 50 yards apart, with an adjustment of the existing lamps at junctions of roads in two cases. The Company ask to be allowed to instal in this case their No. 2 inverted superheated burner, for which they claim 100 p.ct. increase in candle power over that of an ordinary No. 2 upright burner now in use, at an extra consumption of only $\frac{1}{2}$ c.ft. of gas per hour, and an extra cost of 7s. 10d. per lamp per annum. The Committee are of opinion that the Company should be allowed to instal the new type of burner, as requested; but that, in view of the claim of increased light from such burners, it will only be necessary to erect eleven lamps, placed at intervals of about 61 yards apart, instead of thirteen lamps placed at the usual distance of about 50 yards.

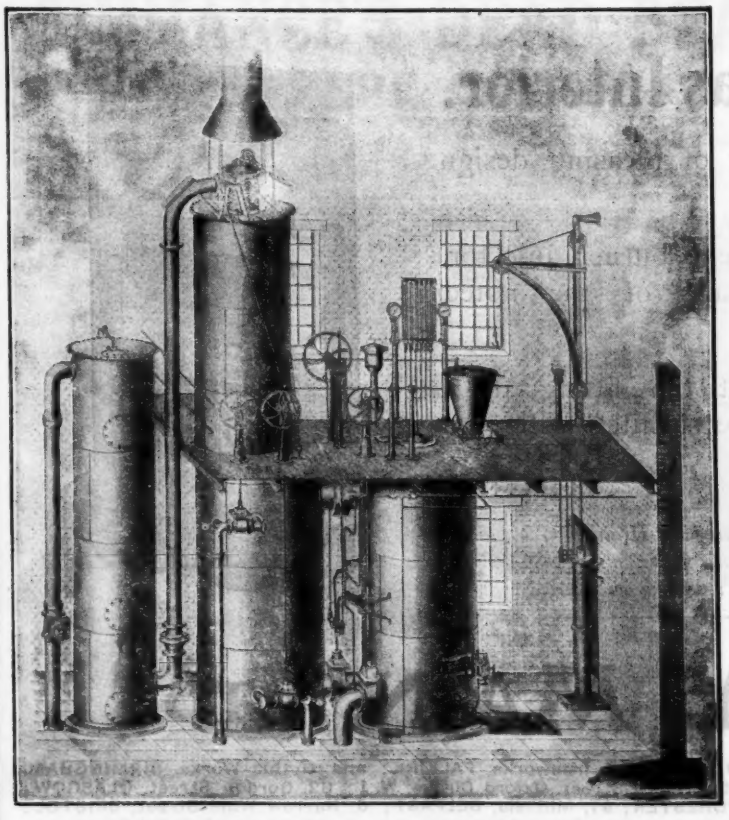
A Big Jump in Price.—The Keady (co. Armagh) Urban District Council have decided to raise the price of gas from 10s. to 15s. per 1000 c.ft., as from Oct. 1.

Mainlaying for Housing Schemes.—The Hebden Bridge Urban District Council have inquired whether the Gas Board would be prepared to lay down a gas-main to a certain area, in the event of the Council proceeding with a housing scheme (forty houses) there. At a meeting of the Board last week, it was stated that it was proposed to lay the main in a trench dug by the Council for water supply. The cost of providing and laying the main would be about £300. The Board decided that they would lay the main if the Council would pay half the cost and 6 p.ct. on the balance until the consumption of gas on the estate reaches 360,000 c.ft.; the whole of the mains laid to remain the property of the Gas Board.

A Surveyor's Duties.—One of the members, at a meeting last week of the Urban District Council of Presteign, said he understood that the salary of the Surveyor was increased by £20 on condition that he lighted the street-lamps. His attention had been since called to the fact that one of the lamps was lighted at 6 p.m. When spoken to upon the subject, the Surveyor replied that he was not going to take a ladder out of the Market Hall, to light a lamp, in his best clothes. He suggested that the ratepayers would want to know why they should have to pay for 2½ hours' consumption of gas for nothing. Eventually, the Chairman said the Surveyor must understand that the lamps were not to be lighted before the proper time.

Assault on a Gas Manager.—At the District Sessions, George Meggott, a labourer, formerly in the employ of the Thorne (near Doncaster) Gas Company, was fined 20s. for an assault on Mr. W. Bolton (the Gas Manager). It appeared that about midnight on Aug. 15, when Mr. Bolton was in sole charge of the works, defendant, who had been summarily dismissed a month before for alleged neglect of duty, came and demanded payment for a shift which he declared was due to him. He struck the Manager, and was abusive, disturbing the whole neighbourhood. The Gas Company took a serious view of the affair, because, had Mr. Bolton been rendered unconscious or incapacitated, it might have been very serious for the gas-works.

Fatal Accident at Birmingham.—The City Coroner returned a verdict of "Accidental death" with regard to William Hill, a gas-works labourer, who was recently injured at the Windsor Street works. He was crushed between a bogey-truck and a wheel which controls the opening and closing of the coke-hopper at the retort-house. Hill was engaged there for the first time on the evening of the accident. Alderman Gregory (Joint Secretary of the Gas and General Labourers' Organization, Birmingham) suggested that a more experienced workman should have been placed on "this dangerous job"—the emptying of the retort. The Works Supervisor replied that he did not consider the work was particularly dangerous. Hill was capable of doing it; and no similar accident had previously occurred. Alderman Gregory observed that he did not suggest that the management at the gas-works had not exercised all reasonable care.



DEMPSTER'S PLANT FOR LIGHTLY CARBURETTED WATER GAS.

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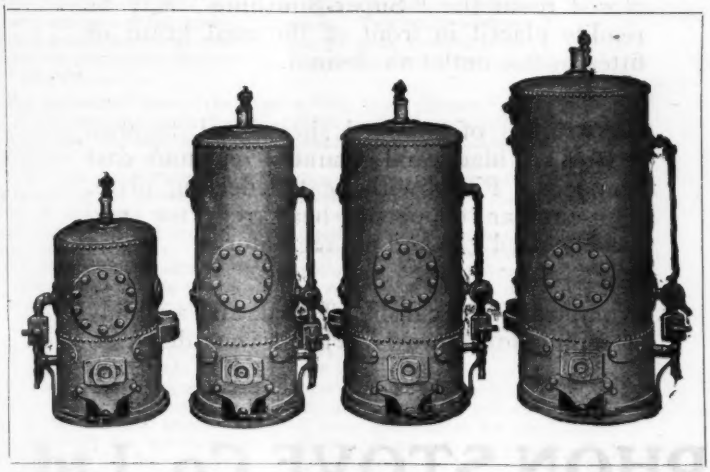
THE HOUSING PROBLEM

"VICTOR" GAS HEATED HOT WATER APPARATUS



Completely overcomes the important question of how to obtain hot water for the bath, hand basin, and sink. They are specially adapted for flats, private houses, and converted maisonettes.

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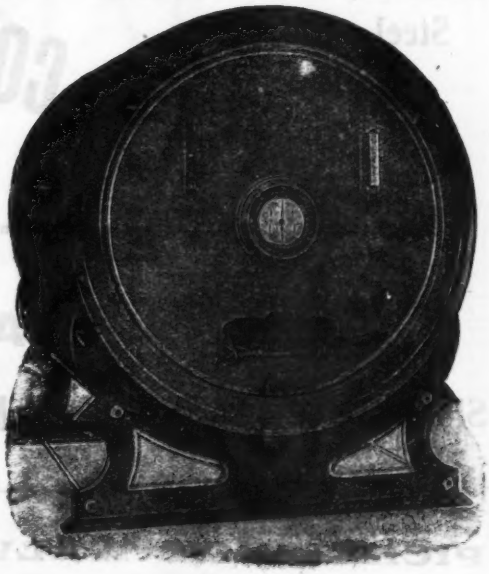

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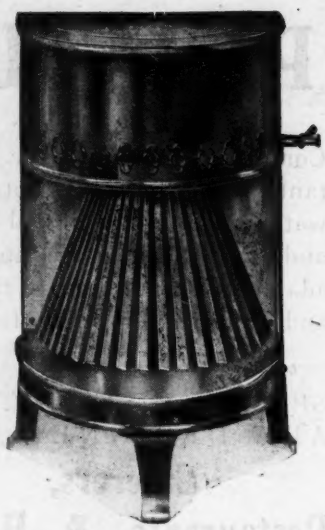
The "Super-Sunshine" Stove



A development of the popular "Sunshine," this stove is low in price, attractive, portable, and efficient in use, and specially suitable for Shops, Offices, etc. When used in a closed room the "Super-Sunshine" may be readily placed in front of the coal grate or fitted to flue outlet as desired.

Constructed of stamped sheet steel, finished in best art black and mounted on stout cast iron legs. Fitted with heat deflecting plate, semi-circular coppered heat reflector and nickel-plated gas and air regulator.

Prompt delivery can be effected, and a supply of selling literature is held at your disposal.

CLARK'S SYPHON STOVE Co., Ltd.

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Gas Plant and all constructional Steel and Iron Work.

Specialists in Slot Meters, Ordinary Meters, Wet & Dry.

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Gas Fires.

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On Sunday evening, churches supplied with electric current by the Hendon Electric Supply Company were for a short time plunged in darkness through a breakdown at the North Metropolitan Company's power house, from which Hendon is supplied. Tram services in the district were also temporarily suspended.

"Patents for Inventions, and information respecting Trade Marks and Designs," is the title of a booklet a new edition of which has just been issued by King's Patent Agency, Ltd., of No. 146A, Queen Victoria Street, E.C., for the guidance of inventors. Within a small compass, the would-be patentee is likely to find just the kind of information for which he is on the look-out—seeing that it has been compiled by a firm whose Managing-Director (Mr. B. T. King) is a Registered Patent Agent of 35 years' practical experience.

Henry Gardner, an ex-soldier, employed by Messrs. Pickles, Hayland, and Co., painters, while engaged in painting a large holder of the Hebden Bridge and Mytholmroyd Gas Board at Calder Holme, was seized with a severe fit of coughing. He was working on a swing plank scaffolding about 24 ft. above the gallery running round the holder, and was seen to fall against the plates. Two fellow-workmen rescued him from his perilous position; but on being lowered to the ground he was practically unconscious. He died before arrival at a doctor's surgery.

In the September issue of the "China Clay Trade Review," the subject of fuel economy in the china clay industry is dealt with by Mr. H. E. Riley (the Engineer, Manager, and Secretary of the St. Austell Gas Company, Ltd.), who is Consulting Engineer to English China Clays, Ltd. Mr. Riley shows that efforts are being made to save fuel for the benefit of the industry and the welfare of the nation. It appears that in the china clay industry, for every 100 tons of clay produced, an average of 15½ tons of coal is used—mainly in connection with the drying of the clay. For pumping and winding, great economy is being effected by the substitution of suction-gas for steam-driven plant. Emphasis is laid on the necessity for regularly testing the flue gases, as a means to fuel economy.

At the Housing and Health Exhibition in the Kelvin Halls, Glasgow, the Corporation Gas Department had an attractive display of appliances. The utilitarian side for cooking and heating was strongly in evidence; and the users have a wide choice of selection as regards size and price. Every contrivance for efficiency and economy is utilized. Labour saving is a chief feature; and the many gas fixtures for the home make work far less exacting. Gas-fires are of very pleasing design, and aid in the ornamentation of the room. The British Commercial Gas Association showed their model of a smokeless house, completely fitted with modern labour-saving apparatus, all operated by gas. They demonstrate the wide range of uses to which gas is put, and how economical and effective it is for such purposes as the wash-house and laundry. Messrs. Ewart & Son, Ltd., staged a comprehensive exhibit of geysers and water-heating appliances.

The Ballybay (co. Monaghan) Gas Light Company's works are for sale; the Company being in liquidation. The works are held for ever at 30s. per annum.

The Gallant Conduct Award of the British Industrial "Safety First" Association is shortly to be presented by the Lord Mayor of Leeds to James H. Tebbs, an employee at the Leeds ammonia distillery of Messrs. Brotherton & Co., in recognition of his brave rescue of a fellow workman named Pilkington. The latter, while repairing the top of an upright boiler used as a decomposer, was gassed and rendered unconscious. Tebbs, who was passing, noticed that something was wrong, climbed to the top of the boiler, which was only 5 ft. in diameter, lifted Pilkington's head away from the gas, tied a rope around him, and got him to the ground, so that he could be taken to the infirmary.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Sept. 22.]

Nos. 26,179—26,746.

AIRD, K.—"Gas-burners." No. 26,541.
BOOTH, A.—"Combination of gas oven and boiler." No. 26,605.
BRIDGMAN, V.—"Gas stoves, boilers, &c." No. 26,570.
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PEARSON, J.—"Cover for money slots for gas-meters." No. 26,227.
PEERLESS BAKING EQUIPMENT COMPANY.—"Gas-burners." No. 26,342.
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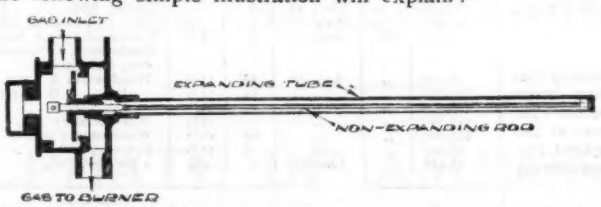

When the outer tube expands or contracts it carries the inner rod with it. This is secured to the tube at one end and has a valve disc at the other end. As the end of the rod is carried backwards or forwards by the expansion and contraction of the tube, the gas-way is opened or closed and gas-consumption is restricted or increased accordingly. There are no wheels, levers or gearing, no capsule, no multiplying effects, no stresses or strains. It is quite direct-acting and is easily adjusted.

Supplied only with complete apparatus.

JOHN WRIGHT & CO., Essex Works, Aston, BIRMINGHAM.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange last week continued on a very reduced scale of activity. The holiday interregnum appears to be still in full operation, and many members are absentees. This factor was, moreover, increased in mid-week by another Jewish holiday. But the mainspring of the paucity of business was, of course, the coal mines question. So long as this lay open upon the knees of the gods, masterly inactivity and abstention from commitments was the guiding rule. However, as negotiations proceeded, certain signs and symptoms were viewed hopefully, and markets for the most part held their own with commendable steadiness.

Among these was the gilt-edged market. Home Government issues practically showed no change at the close, Friday's figures being: Consols 45⅞-46⅛, War Loan 84⅝-84⅞, Funding 67½-68, Victory 74 11/16-75¼. Indian fell and rose again. Corporation issues were not strong. Home Rails were supported; Canadian and Argentine vacillated.

The Foreign Market was affected by exchange fluctuations. French, Chinese, and Russian were easy; but Japanese was steady. In Miscellaneous, Rubber was down; but Oil did well. Insurance, Textiles, and Iron and Steel improved.

Business in the Gas Market was extremely quiet, some days being almost barren; and this lack of support may account for some prices being rather easier than they were in the preceding week. In the London Companies, Gas Light ordinary and maximum and South Metropolitan had a reduction; but in the Suburban Group, Tottenham "B" and Wandsworth "B" advanced. In Continentals, European was steady; but Imperial weakened, and was put back 5.

Bargains done for cash during the week were as follows: On Monday, Bristol 60½, 61¼, European 7⅜, Gas Light ordinary 55⅞, 56, 56¼, ditto maximum 39, Imperial Continental 128, 129, ditto debenture 83¾, 84¼, 84⅜, Oriental 99¼, South Metropolitan 63, 64. On Tuesday, British 22⅜, European 7⅜, Gas Light ordinary 55, ditto preference 56, 56¼, ditto debenture 46¾, Imperial Continental 128¾, ditto debenture 84⅜, 85, South Metropolitan 63, 63¼, 64½, ditto debenture 46½, Tottenham "B" 53½. On Wednesday, Brentford "A" 50, Gas Light ordinary 56, ditto preference 56, 57, ditto debenture 47, Imperial Continental 127½, Primitiva preference 22s. 6d., South Metropolitan 63, 64. On Thursday, British 21⅝, 21⅞, Gas Light ordinary 55, ditto preference 56, Imperial Continental 125½, South Metropolitan 64, Tottenham "B" 53, Petersfield and Selsey 19s. On Friday, Bournemouth "B" 9, 9 1/16, Commercial 4 p.ct. 55½, 56, ditto 3½ p.ct. 47, 47½, 48, Gas Light ordinary 54½, 55½, ditto maximum 40, Imperial Continental 124, 125, 126, Primitiva preference 23s. 1½d., debenture 69¾, 70, South Metropolitan 62½, Tottenham "A" 61.

The Money Market took a fresh turn last week. After opening very comfortably, a pronounced demand set in and continued, culminating in a degree of sharp pressure. Discount rates were materially harder. Silver opened and closed at 5 1/16d., with scarcely any intermediate variation. The Bank rate is 7 p.ct., fixed on April 17.

The Dalton (near Barrow-in-Furness) Gas Committee have received intimation from the Amalgamated Union of Labourers that 13s. 10d. per shift is paid to labourers at the neighbouring Millom Gas-Works, against 12s. at Dalton. The Committee are considering the matter.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 27	4	4%	Aldershot 4 p.c. Pref. .	...	56—61	...
1,551,868	,,	Mar. 26	2½	3 1/16%	Alliance & Dublin Ord.	59—64	38—43	...
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	47—52	...
280,000	5	May 13	7½	8%	Bombay, Ltd. . . .	5⅛—6⅛	4¼—5	...
50,000	10	Aug. 12	16	5%	Bourne- (10 p.c. . .	29—30	8½—8¾	...
383,110	10	,,	7	7%	mouth Gas (B 7 p.c. .	15—15½	8½—9⅛	9—9 1/16
115,000	10	,,	6	6/-	and Water (Pref. 6 p.c.	13½—14	7¼—8½	...
162,065	—	June 25	—	4%	(4 p.c. Deb.	...	62—64	...
992,045	Stk.	July 14	14	30/-	Brentford A Consolid. .	261—266	50—55	50
734,920	,,	,,	11	26/3	Do. B New . .	204—209	47—52	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	68—73	...
221,400	,,	June 10	4	4%	Do. 4 p.c. Deb. .	91—93	60—63	...
214,775	,,	Aug. 27	11	7½%	Brighton & Hove Orig. .	208—213	120—125	...
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	78—83	...
1,287,500	Stk.	July 29	5	5%	Bristol 5 p.c. max. . .	...	...	60½—61½
530,000	20	Sept. 15	12½	10%	British	44—45	21—23*	21½—22½
120,000	Stk.	June 25	4	4%	Do. 4 p.c. Deb. Stk.	88—90	57—59	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	42—45	...
100,000	10	May 27	—	—	Cape Town & Dis., Ltd.	1¼—2¼	7—7½	...
100,000	10	,,	—	4½%	Do. 4½ p.c. Pref. .	4—6	5½—6½	...
100,000	Stk.	June 25	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	56—61	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	...	...
1,513,280	,,	Aug. 12	5/9/4	30/-	Commercial 4 p.c. Stk.	106—108	54—59	55½—56
560,000	,,	,,	5¼	26/3	Do. 3½ p.c. do.	103—105	47—52	47—48
475,000	,,	June 10	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	45—47	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	27—32	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	40—60	...
51,600	,,	Aug. 27	14½	10½%	Croydon A 10 p.c. . .	...	125—135	...
278,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	..	85—95	...
492,270	Stk.	—	6	5%	Derby Con. Stk. . .	123—125	...	...
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd. . . .	17½—18	7—8	7½—7⅝
16,298,975	Stk.	July 29	4/17/4	30/-	Gas (4 p.c. Ord. . .	98—102	54—57	54⅛—56½
2,600,000	,,	,,	3½	26/3	Light (3½ p.c. max. .	76—79	39—42	39—40
4,062,235	,,	,,	4	4%	and (4 p.c. Con. Pref.	96—99	55—58	56—57
4,674,850	,,	June 25	3	3%	Coke (3 p.c. Con. Deb.	72½—74½	45—48	46½—47
130,000	,,	Dec. 11	10	10%	(10 p.c. Bonds. .	...	...	...
82,500	,,	Sept. 15	5	3½%	Hastings & St. L. 5 p.c.	...	53—58*	...
258,740	,,	,,	3½	2½%	Do. 3½ p.c.	87—89	37—39*	...
70,000	10	May 13	11	8%	Hongkong & China, Ltd.	16½—16¾	8¼—9⅛	...
86,600	Stk.	Sept. 15	9	5½%	Hornsey 7 p.c. . . .	...	87—89*	...
131,000	,,	Aug. 12	7½	4½%	Ilford A and C . . .	151—154	84—89	...
65,780	,,	,,	6½	3½%	Do. B	115—118	64—69	...
65,500	,,	June 25	4	4%	Do. 4 p.c. Deb. . .	92—94	55—58	...
4,940,000	,,	May 14	9	4½%	Imperial Continental .	130—160	123—128	124—129
1,235,000	,,	Aug. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	82—87	83½—85
235,242	,,	Sept. 15	6½	5%	Lea Bridge Ord. 5 p.c. .	119—121	80—85*	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. (A.	211—213	...	...
					(B.	146—148		...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 12	7/5/6	3½%	Maidstone 5 p.c. . . .	...	52—57	...
75,000	5	June 11	6	3%	Malta & Mediterranean	4¼—4⅝	1⅝—2¼	...
250,000	100	April 1	4½	4½%	Met. of Melbourne (4½ p.c. Deb.	99—101	89—96	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd. . .	11½—12	70—75	...
1,875,892	,,	July 29	4½	3½%	Newcastle & Gatsh'dCon.	98¼—99½	60—61	...
529,705	,,	June 25	3½	3½%	Do. 3½ p.c. Deb.	82—83	50—51	...
15,000	10	Sept. 15	—	8%	North Middlesex 10 p.c.	...	12⅜—13¼*	...
55,940	10	,,	7/14/0	53%	,, ,, 7 p.c.	14—15	7⅛—8*	...
300,000	Stk.	May 13	8	8%	Oriental, Ltd. . . .	117—122	98—101	99½
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd. . . .	7¼—7⅞	2—3	...
60,000	50	Aug. 27	13	7½%	Portsea Island, B . .	128—131	65—70	...
100,000	50	,,	12	6½%	Do. C . .	118—121	50—55	...
249,980	5	April 29	8	—	Primitiva Ord. . .	5⅜—6	1—1⅛	...
499,960	5	June 26	5	—	Do. 5 p.c. Pref. .	4⅜—5	1—1⅛	22/6—23/1½
521,600	100	June 1	4	4%	Do. 4 p.c. Deb. .	91—93	69—71	69¾—70
600,000	Stk.	July 29	4	4%	Do. ,, ,, 1911	...	40—42	...
346,198	,,	June 25	4	4%	River Plate 4 p.c. Deb.	85—87	38—43	...
150,000	10	Mar. 26	6	6/-	San Paulo (6 p.c. Pref.	10½—11	6½—7⅛	...
125,000	50	July 2	5	5%	(5 p.c. Deb.	47—49	38—40	...
135,000	Stk.	Aug. 27	10	5%	Sheffield A	223—224	68—73	...
209,984	,,	,,	10	4%	Do. B	222—224	58—63	...
523,500	,,	,,	10	3½%	Do. C	220—222	53—55	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c. . .	...	...	...
90,000	10	June 25	9	9%	South African . . .	10½—11½	11—12	...
6,609,895	Stk.	Aug. 12	5/4/0	30/-	South Met. 4 p.c. Ord..	111—113	60—65	62½—64½
250,000	,,	July 14	—	5%	Do. Pref. .	...	91—93	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb..	72½—74½	45—47	46½
224,820	,,	Aug. 27	8½	3%	South Shields Con. Stk.	157—159	95—96	...
1,087,795	,,	July 29	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	62—67	...
247,558	,,	June 25	5	5%	Do. 5 p.c. Deb. Stk.	116—118	68—73	...
647,740	,,	May 13	7½	3½%	Southampton Ord. . .	99—102	57—60	...
121,275	,,	June 25	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 12	—	3½%	Tottenham (A 5 p.c. .	135—138	60—65	61
782,275	,,	,,	6	2½%	District (B 3½ p.c. .	115—117	53—58	53—53½
181,255	,,	June 10	4	4%	(4 p.c. Deb.	87—89	60—63	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd. . . .	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Sept. 15	5	3½%	Tynemouth 5 p.c. max.	108½—109	70—71*	...
30,000	,,	Aug. 27	8½	47/6	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	75—80	...
255,636	,,	,,	6½	32/6	Do. B 3½ p.c.	129—134	53—58	...
108,075	,,	,,	—	33/3	Do. C . . .	...	50—55	...
140,865	,,	,,	—	33/3	New Ordinary . . .	...	50—55	...
352,000	,,	,,	6½	26/3	Wimbledon 5 p.c. . .	117—122	43—48	...
98,000	,,	,,	6½	32/6	Epsom 5 p.c. . . .	121—126	50—55	...
88,416	,,	June 25	3	3%	3 p.c. Deb. Stk. . .	66—69	44—47	...

* Ex Div.

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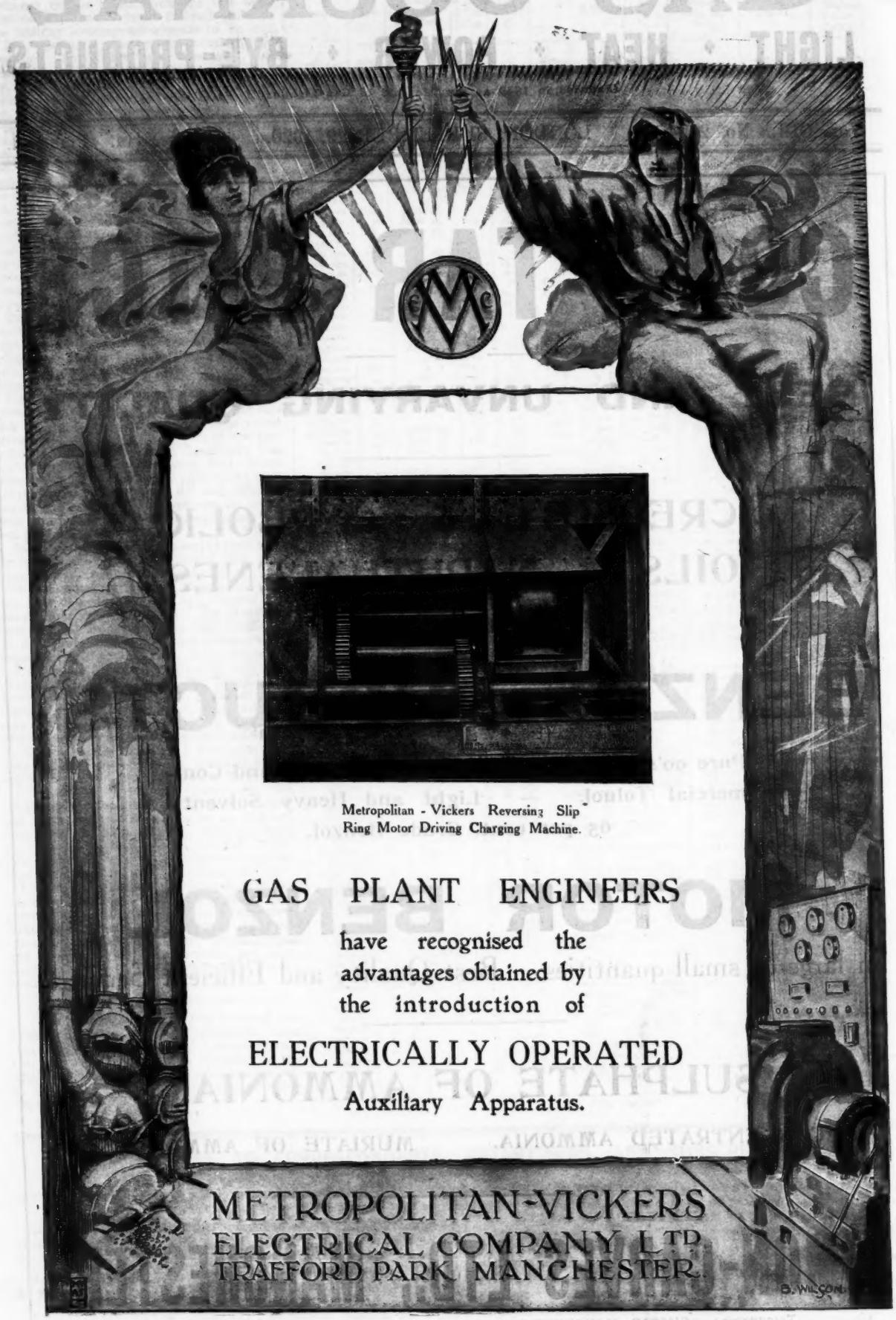
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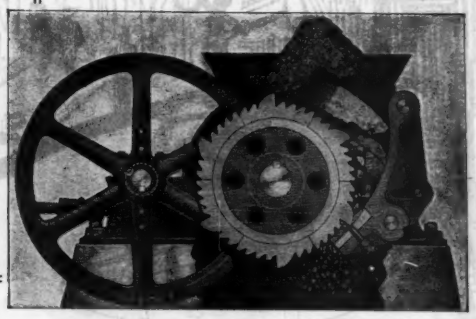

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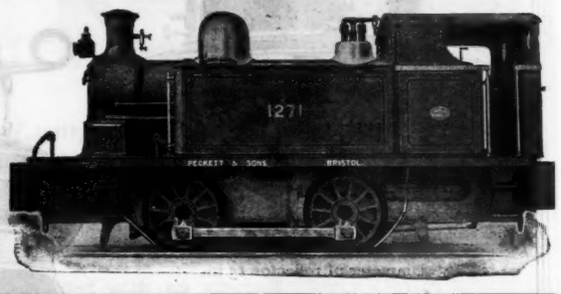

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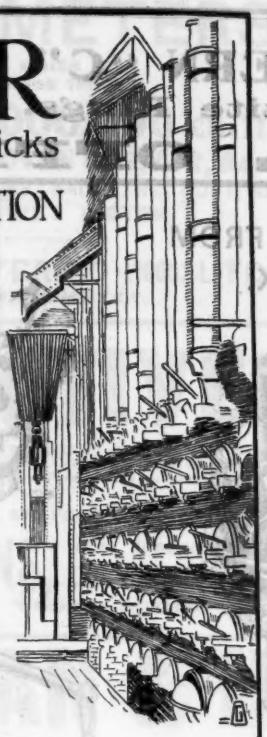

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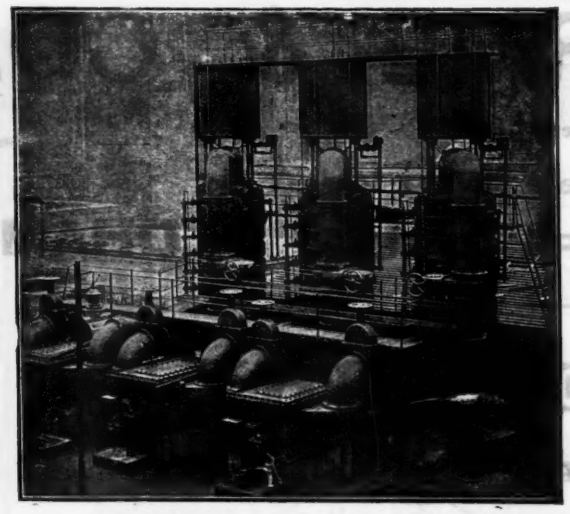

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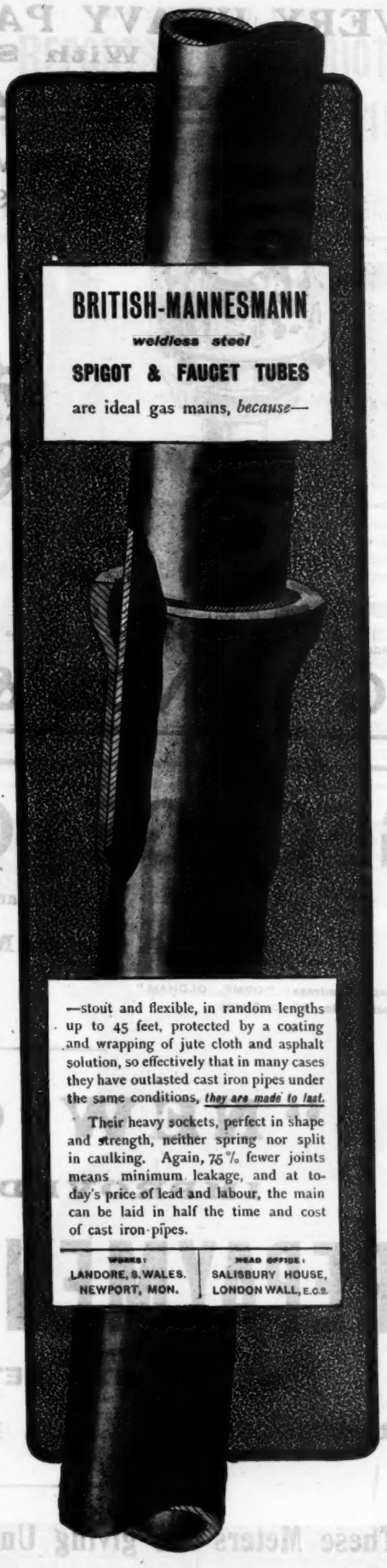

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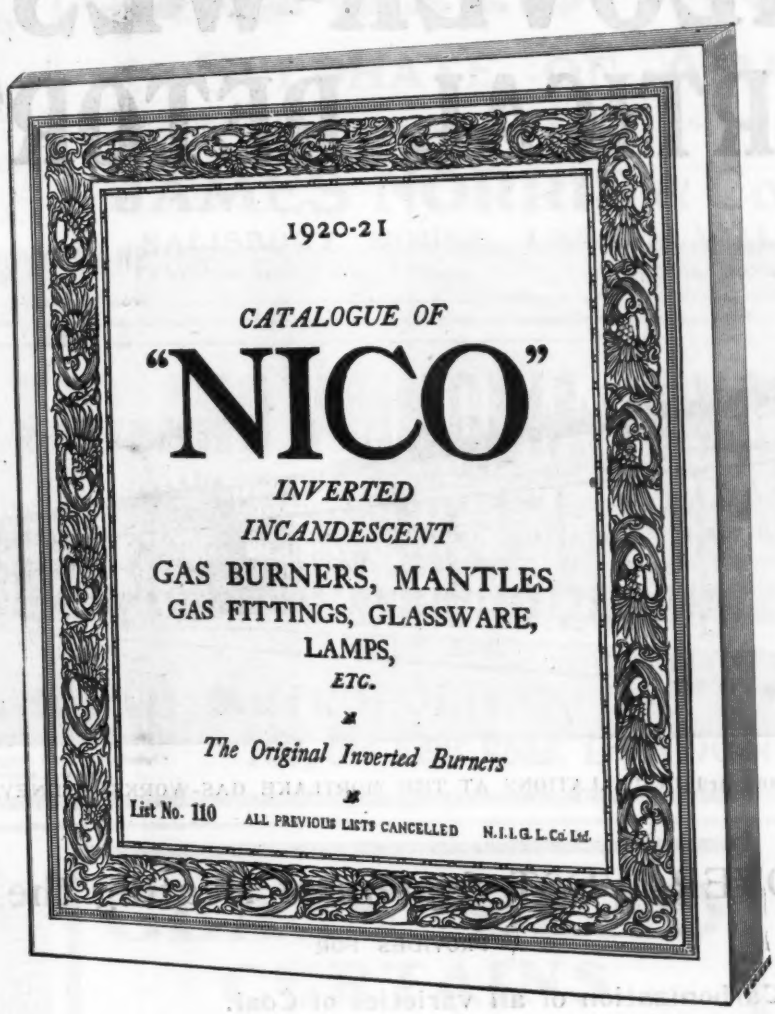

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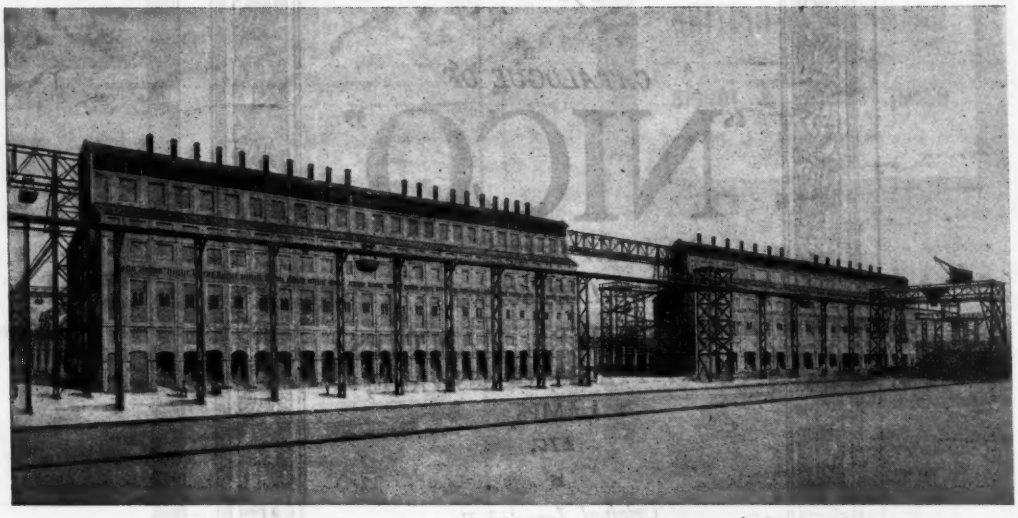

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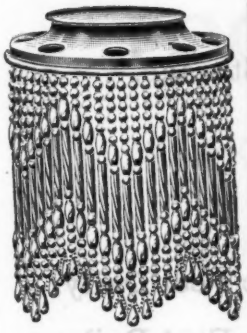
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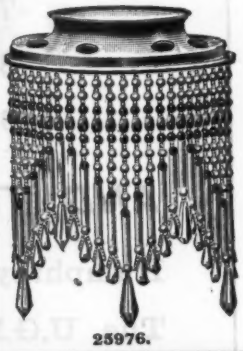
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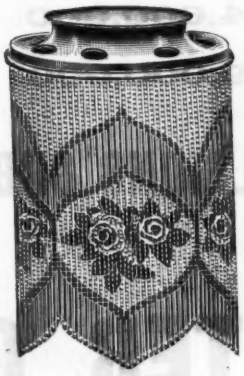
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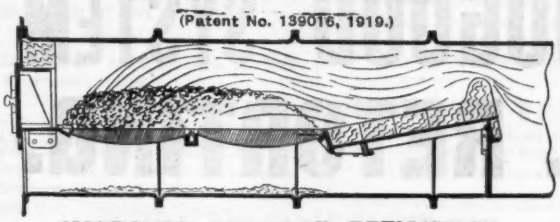

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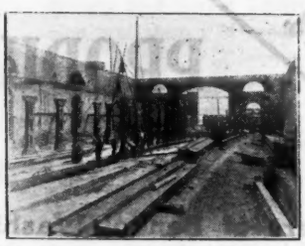

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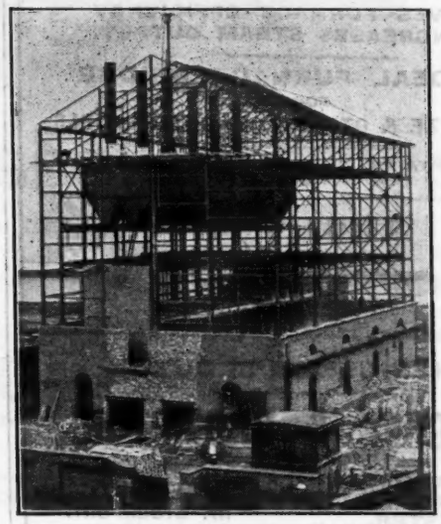

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Applications should be sent to the undersigned as soon as possible.
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Applications, stating Age, Experience, and if Single or Married, with *copies* of Testimonials, to be addressed to the SECRETARY of the COMPANY, Moorgate Station Chambers, Moorfields, LONDON, E.C. 2.

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TAR, ACID, AND OXIDE.

THE Gas and Water Committee of the above Corporation are prepared to receive TENDERS for the Purchase of the Surplus TAR produced at their Gas-Works, Saviletown, for the term of One Year from the 1st day of October, 1920 (or for such longer term as may be decided upon).

The Tar will be Delivered free into Contractor's Boats at the Gas-Works Wharf on the Aire and Calder Canal, Saviletown, Dewsbury, or into Contractor's Railway Tanks at their Gas-Works Sidings (Lancashire and Yorkshire Railway), or into Purchaser's Motor Tanks at the works.

Prices are also desired for the SUPPLY of SULPHURIC ACID, OXIDE OF IRON, and also for the PURCHASE of the SPENT MATERIAL.

Sealed Tenders, endorsed, to be sent to the undersigned on or before Monday, the 11th day of October next.

Further information, if required, may be obtained on Application to the Gas Engineer, Geo. Wm. Fligg, Gas-Works, Saviletown, Dewsbury.

The Council do not bind themselves to accept the highest or any Tender.

JNO. HALL,
Town Clerk.

Town Hall,
Dewsbury,
Sept. 20, 1920.

BOLLINGTON URBAN DISTRICT COUNCIL.

THE Gas Committee of the Bollington Urban District Council are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR to be made in the Gas-Works during a period of Twelve Months commencing the 4th of October next. Contractors to remove the Tar and Ammoniacal Liquor from the Gas-Works at their own expenseas often as required, so that the same may not be an inconvenience to the works.

The quantity of Tar and Ammoniacal Liquor made in a Year amounts to about 600 Tons.

Contractors are requested to state the price per Ton for the Tar and Ammoniacal Liquor separately.

Tenders to be endorsed and sent in to me on or before the 2nd of October.

The Council do not bind themselves to accept the highest or any Tender.

By order,
SAMUEL KNIGHT,
Clerk to the Council.

Council Offices,
Bollington,
Near Macclesfield,
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PATENT NOTICES.

THE proprietors of Patent No. 111,871, Bostaph Engineering Corporation, for "RETORT," are anxious to enter into Negotiations with a Firm or Firms for the Grant of LICENCES, on Reasonable Terms, or to treat for the SALE of the Patent outright.

Full Particulars can be obtained on application to J. S. WITHERS AND SPOONER, Chartered Patent Agents, 51 and 52, Chancery Lane, LONDON, W.C. 2.

THE proprietors of Patent No. 109,523, Bostaph Engineering Corporation, for "Process of Obtaining COKE and BYE-PRODUCT FROM COAL," are anxious to enter into Negotiations with a Firm or Firms for the Grant of LICENCES, on Reasonable Terms, or to treat for the Sale of the Patent outright.

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Compiled and noted by
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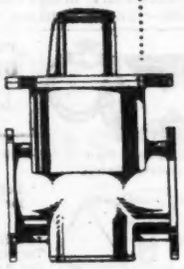

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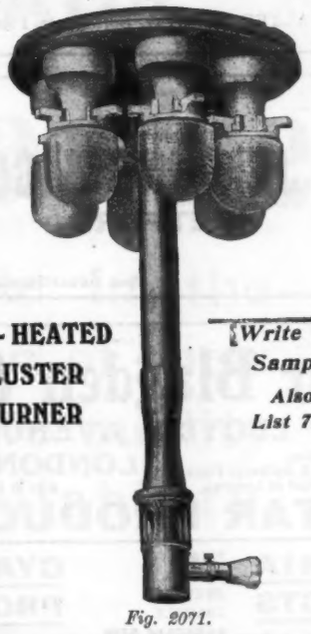

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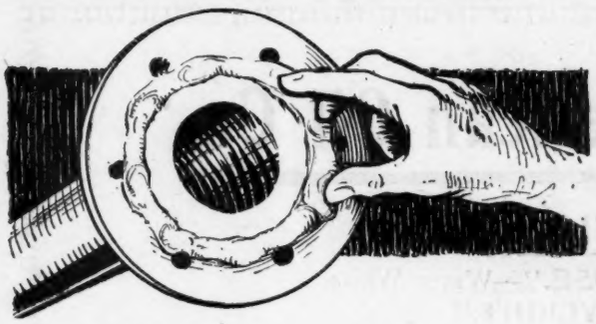

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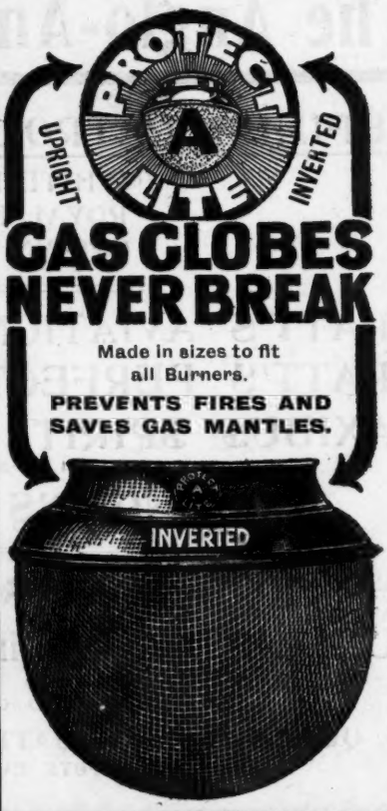

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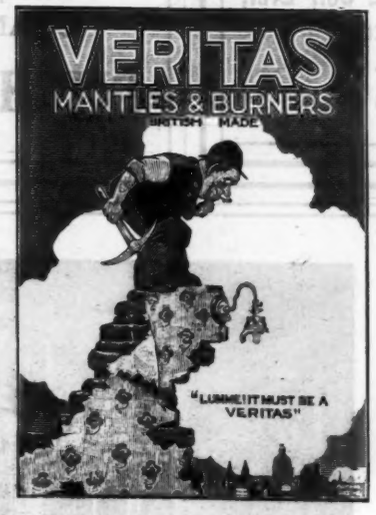

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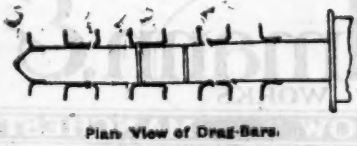

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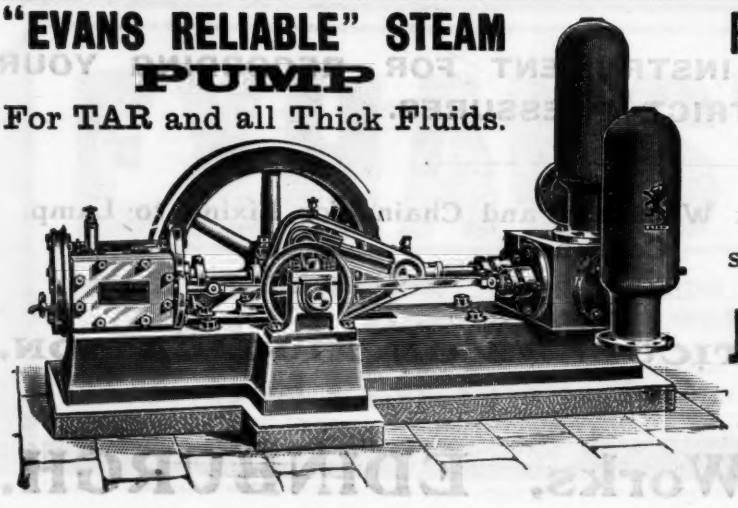

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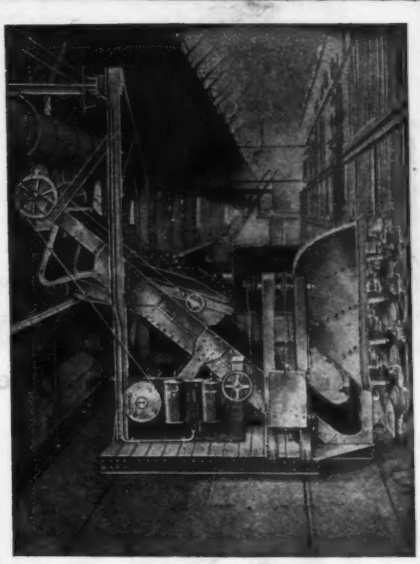

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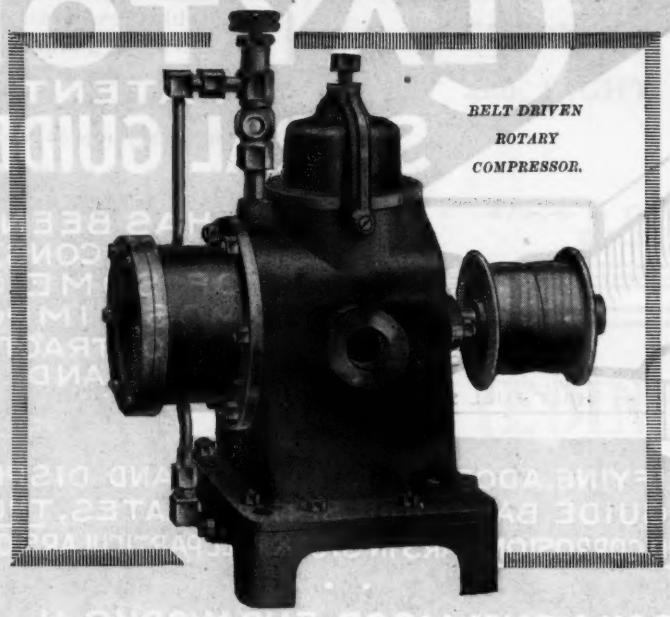

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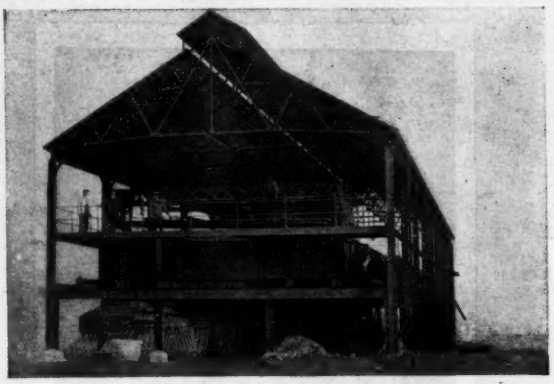

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